The Chemical Age

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NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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Science and Industry

THE past ten days has been a busy time for chemical societies and this week, besides details of the functions of the Institution of Chemical Engineers at its Corporate meeting, we publish accounts of the annual stocktaking of several sections of the Society of Chemical Industry in various parts of the country. Mr. J. A. Reavell's review of recent developments, in his presidential address to the chemical engineers, was calculated to make the breast of the chemist swell with legitimate pride. Woollen research, leather, agriculture, rubber, sugar, oil, and, of course, the various branches of metallurgy, were some of the instances he quoted of how the chemist was removing obstacles, which had often brought an industry to a dead-end, and opening up roads for development and progress.

An interesting point stressed by Mr. Reavell, and one which has not been without its controversial side, is the place of the scientist in industry. In the past, he said, science had been an appendage of industry; he pleaded for it to be made a fundamental part, and for there to be a scientific director on the boards of companies to enable reports from the research side of the business to be given effect within a reasonable time, instead of the "time lag" which too frequently existed in such cases. In defence of the industrialist it could be stated that he had suffered much because the scientific man had not been sufficiently interested in the financial or commercial aspect of business. The spirit of superiority, if not almost of contempt, which had often been shown by scientific people towards commerce and finance must be altered, declared Mr. Reavell. To-day science must more and more be a part of industry, and if this country was to hold its own in the world's markets, it would only be when industry took science completely into partnership.

This question was again the burden of the majority of the speeches at the annual dinner of the Institution, which drew together a notable gathering of industrialists and representatives of learned societies, educational and research institutions.

Viscount Leverhulme, who proposed the toast of "The Institution of Chemical Engineers," said that, under modern scientific conditions, chemistry and engineering could no longer be put into separate water-tight compartments. They were a beneficial combination. One of the most significant factors in industry to-day was rationalisation, which not only simplified the problems of buying and selling, but promoted concerted, in place of isolated, action. The only danger was that as industries grew bigger they might be lulled into the false security of imagining that their competitors were few, and slacken research. That had to be guarded against.

Sir Josiah Stamp, proposing "Science and Industry," said the remarkable progress of this Institution was an illustration of the technique of modern progress, which had been defined as "transcending the obvious." Out of one old science the Institution had created a new one of their own, and had made for themselves a new element.

An Overseas Trade Council

EACH month now the national returns of overseas trade are awaited with greater and greater interest, in the hope that the figures may at last show a better comparison with the corresponding totals of the two preceding years. True, the chemical industry has lately tended to prove itself a notable exception to a general downward trend, but it is impossible to derive genuine comfort from this more or less isolated prosperity. In health one is the more sensible of the sickness of others.

It is not with unalloyed optimism that at this juncture we see the establishment of yet another body, under the auspices of the Department of Overseas Trade, which is to set itself out to get at the causes of our trade troubles. Find them it may, but whether the individualist spirit which is to remedy them can flourish under its wing is not so certain.

Mr. G. M. Gillett, M.P., Secretary of the Department, announced on Thursday that he has for some time felt that the usefulness of his Department would be strengthened by the creation of a special organisation to examine the problems of export trade, study present and potential markets, constantly review the volume and trend of trade, investigate reasons for decline in exports by trades and markets, and ascertain possible remedies, with the object of the expansion of British trade. For this purpose an Overseas Trade Development Council has been set up.

The personnel of the Council is as follows: Mr. G. M. Gillett, M.P. (chairman), Sir Edward Crowe, Mr. G. I. H. Lloyd, Mr. Louis Beale, Mr. Arthur Mullins and a representative of the Lord Privy Seal's Office as officials, together with the following representatives of commerce: Sir Gilbert Vyle (managing director of W. and T. Avery, Ltd.; president British Engineers' Association); Mr. L. W. Matters, M.P. (chairman of directors of "British and Overseas Publications, Ltd."); Mr. Hugh Lewis (director of Liverpool and London and Globe Insurance Co., Ltd.), and Mr. D. A. Horner (late manager of Credito Italiano, London).

This standing Council, which will work in close co-operation with the Lord Privy Seal, will constantly examine the state of export trade as a whole, and in order that its work should be as specific as possible, when particular trades, industries or markets are being reviewed, special representatives of trade and industry will be invited to attend the meetings of the Council. Accordingly, a panel of representatives, who will assist the work of the Council, and who will be available for informal consultations, is being formed.

The following representatives of industry have consented to serve on the panel, to which other names will be added in due course: Sir Arthur Balfour, Lord Barnby, Sir Ernest Jardine, Sir William J. Larke, Mr. Kenneth Lee, Sir William Clare Lees, Mr. J. G. Nicholson, Mr. P. J. Pybus, M.P., Mr. G. E. Rowland, Dr. E. C. Snow, and Major Frank Wedgwood.

Speaking at the annual meeting of the Association of British Chambers of Commerce, where he was the guest of honour on Thursday, Mr. Gillett declared that if Britain is to regain world leadership in trade, it will require greater effort than we have yet put forth since the war, based on more accurate knowledge and a better understanding of the position than we have had in the past. We have commonly thought of two partners in industry, he said—management, or capital, on the one hand, and production, or labour, on the other. But are there not three? Is not distribution or marketing equally important?

And, we wonder, is the third any more likely to flourish under close governmental inquiry than the first two?

Billingham Development

THE disposal of waste material is often one of the most difficult problems in connection with modern large-scale industries, and whole ranges of hillocks in some industrial centres of England are witness to its magnitude. A happy solution arrived at at Billingham is shown in the draft agreement with Imperial Chemical industries which was revealed at the meeting of the Tees Conservancy Commission on Monday.

In addition to the five years' option which is given to I.C.I. to purchase 267½ acres at Port Clarence for the construction of a large wet dock and the erection of chemical works, the agreement provides for the deposit of the company's waste material on the Tees tidal foreshore on which the Commissioners are carrying out reclamation works.

The site to which the option applies, is reclaimed tidal foreshore on the north bank of the river, opposite Eston Wharf. The company has for some time been investigating the possibilities of building a large dock at which their extensive export trade in sulphate of ammonia could be handled, and as an alternative to making use of the L.N.E.R. dock at Middlesbrough as at present.

Books Received

LATEX, ITS OCCURRENCE, COLLECTION, PROPERTIES AND TECHNICAL APPLICATIONS. By Ernst A. Hauser. Translated by W. J. Kelly. New York: Chemical Catalog Co., Inc. Pp. 201. $4.

SOUVENIR HENRY HILL HICKMAN CENTENARY EXHIBITION, 1830–1930, AT THE WELLCOME HISTORICAL MEDICAL MUSEUM. London: The Wellcome Foundation, Ltd. Pp. 86.

The Calendar

Apl. 15 & 16	Society of Glass Technology: Annual general meeting.	Sheffield.
25 & 26	Faraday Society. General Discussion on "Optical Rotatory Power." Annual General Meeting.	Burlington House, Piccadilly, London.
28	Oil and Colour Chemists' Association. Annual Dinner. 7 p.m.	Connaught Rooms, London.
May 1	Chemical Society. 8 p.m.	Burlington House, Piccadilly, London.
1 & 2	Iron and Steel Institute: Annual meeting.	House of the Institution of Civil Engineers, Great George Street, London.
2	Faraday Society. "On Coagulation." Professor Dr. Georg Wiegner. 8 p.m.	Burlington House, Piccadilly, London.
5	Society of Chemical Industry (London Section): "Observations on the Condensations between Formaldehyde and Aromatic Compounds." Professor G. T. Morgan. 8 p.m.	Burlington House, Piccadilly, London.
7	Society of Public Analysts. 8 p.m.	Burlington House, Piccadilly, London.
7	Institute of Metals. Annual May Lecture	London.
8	Oil and Colour Chemists' Association. Annual General Meeting. "Some Technical Methods of Preparing Wood Oil for Use in Paints and Varnishes. A. W. C. Harrison. 7.30 p.m.	30, Russell Square, London.
9	Chemical Engineering Group. Annual General Meeting and Dinner: "The Effect of Filter Aids on Industrial Development." Howard A. Young.	London.
13	Institution of Petroleum Technologists. 5.30 p.m.	John Street, Adelphi, London.
14	Society of Chemical Industry (Newcastle Section): "Cenospheres and the Structure of Coke." Dr. F. S. Sinnatt.	Armstrong College, Newcastle-on-Tyne.
15	Chemical Society. 8 p.m.	Burlington House, Piccadilly, London.
16	Institute of Chemistry (Belfast Section): Annual General Meeting.	Royal Belfast Academical Institution.
23-24	Institute of Chemistry and Society of Chemical Industry (Edinburgh Sections): "Chemistry in Naval Warfare." Professor Kendall.	Edinburgh.

Institution of Chemical Engineers

The Eighth Annual Corporate Meeting

A somewhat extensive programme was carried through successfully at the eighth annual corporate meeting of the Institution of Chemical Engineers held at the Hotel Victoria, London, on Friday, April 4. A satisfactory report was presented and tributes were paid to Mr. J. A. Reavell, who continues in office as President for another year.

IN its annual report, which was unanimously adopted, the Council recorded the continuous growth of the Institution, as shown in the following figures :—

	December 31. 1928.	December 31. 1929.	Difference.
Hon. members	9	9	—
Members	246	273	+27
Associate-members	192	201	+ 9
Graduates	72	101	+29
Students	16	14	−2
	535	598	+63

The decrease in the number of students was due to transfers to the class of graduate.

The accounts showed that the gross income derived from all sources amounted to £2,626 13s. 9d., an increase of £335 11s. 11d. over the previous year. This was accounted for partly by the increased membership and partly by payments made by the Diesel Engine Users' Association for office accommodation and clerical services. The compounded subscription account had received a slight increase, the total fund now standing at £249 19s. 3d. invested in trustee securities.

The Council continued to press for the extension of education in chemical engineering. During the year the course in chemical engineering at King's College, London, had become definitely established and the Council had great satisfaction in recognising the course as exempting from the Institution examination those students who completed it with credit. The fourth examination for admission to the Associate-Membership was held during the year. The Council was glad to acknowledge its indebtedness to the examiners for their careful work in the preparation for and conduct of the examination.

The number of suitable vacancies placed before the Appointments Bureau had been considerable and several satisfactory appointments had resulted. The volume of junior appointments negotiated had greatly increased, but the results in this category had not been so satisfying, the demand emphasising a higher engineering qualification than the average graduate possesses. The appreciation among employers of the value of the Bureau is maintained.

The Council had accepted from Mrs. Hinchley the gift of an eighteenth century carved chair for use in the Council Room as a President's chair. A plate recording the circumstances of the gift has been affixed to the chair. The Council also received from Prince Ginori Conti a medal struck in celebration of the centenary of the first use of the natural steam of the Tuscan "soffioni" in the manufacture of boric acid.

An invitation had been sent to the American Institute of Chemical Engineers for its members to pay an official visit to England during 1932.

Election of Officers and Council

The result of the ballot for the election of Honorary Officers and members of Council for the year 1930 was announced as follows :—

President.—Mr. J. Arthur Reavell.

Vice-Presidents.—Mr. C. S. Garland and Mr. F. H. Rogers.

Hon. Secretary.—Professor J. W. Hinchley.

Hon. Treasurer.—Mr. F. A. Greene.

Ordinary Members of Council.—Mr. H. W. Cremer, Mr. H. J. Pooley, Dr. F. S. Sinnatt, Mr. H. J. T. Ellingham and Mr. R. F. Stewart (the last two Associate Members).

The President then presented medals awarded by the Institution, together with scrolls which accompanied the medals, setting out the services in respect of which the medals had been awarded. The names were published last week.

Votes of Thanks

Mr. H. Talbot, proposing a hearty vote of thanks to Mr. Reavell for his services as President during the past year, coupled with an expression of satisfaction that he was to continue in office for the ensuing year, said that all the members must have been charmed by his manner and impressed by his ability ; the highest honour that the Institution could confer upon him was but little recognition of his true worth.

Mr. W. A. S. Calder, seconding, said that the Institution had been peculiarly fortunate in respect of its presidents in the past, and it was peculiarly fortunate still.

The President, responding, said that the presidency of an Institution of that kind, if it did nothing else, made one appreciate what a fine lot of men were those with whom one came into contact, and what a fine spirit existed among technical people with a will to do good work, regardless of their own personal convenience, to help forward this great country. That, indeed, was sufficient reward. He was not repeating idle words when he said that the opportunities for chemical engineers at the moment were extraordinarily wonderful ; he hoped they would be able to rise to the occasion, and that our professors, in the training of our younger men, as well as those who were in the thick of the fight, would do their utmost to keep Great Britain foremost in the whole world in chemical engineering.

On the motion of Mr. G. S. Whitham, seconded by Dr. A. J. V. Underwood, a hearty vote of thanks was accorded the honorary officers and members of Council.

The Presidential Address

The Role of Science in Industry

THE President said he had hoped to take as the subject of his Presidential Address the dispersion of liquids from rotating discs, with particular reference to the size of drops or particles formed. Unfortunately, however, although he had done a considerable amount of work on this subject, and had developed a theory in relation thereto, important experimental work remained to be completed before he felt justified in addressing the Institution on this subject. Therefore, he had been asked to discuss the rôle of science in industry, which was one of great and ever-growing importance.

In order to give the members a clear conception of what he meant by the term "Science," he said that Herbert Spencer declared that "Science is organised knowledge," but he (the President) preferred to define it as "ordered knowledge." A scientifically trained mind was able to examine a problem in an orderly manner, to pass by ordered reasoning from one aspect of the subject to another, and so forecast definite results from a particular course of action.

The Wool Industry

Discussing the great assistance which science had rendered to particular industries, he referred first to wool. Chemistry had had a great bearing on the woollen industry, for upon its guidance depended such problems as the composition of the sheep dips and the materials used for marking the sheep and their effects on the wool. There had always existed a great difficulty in the estimation of damage in a sample of wool or of cloth. Methodical work on this problem had provided a solution. It was based on a reaction—similar to the formation of an azo-dyestuff—between a reagent applied to the wool and one of the primary constituents of the wool itself. This reagent could penetrate only to the inner cortex of a fibre when the epithelium or outer scale of the fibre was damaged. The injured portions then took on a dark brown stain, whereas the perfectly sound fibres remained white. So successful had this method become that it had been utilised as a means of quantitative estimation of damage to wool fibre. The treated wool was dissolved in a sodium hydroxide solution yielding a coloured liquor, the intensity of which could be matched against a standard solution. The colour intensity was recorded as being proportional to the damage or degree of unsoundness of the sample of wool tested.

The work of the chemist in regard to the sulphur group in wool had also had some interesting results.

Science, too, could examine the changes in the natural properties of the wool after shearing and during transport and storage, and how the natural properties might be maintained during the processes the wool had to undergo prior to spinning.

Mysteries of Leather

Leather was another age-old industry, which had long been held in the grip of tradition, but science was rapidly penetrating its mysteries. It was said by a leading authority that at least half the problems which occurred to tanneries, leading to a poor quality of output and financial loss, were due to the unsatisfactory condition in which the tanner received his raw materials. Investigations were being made on the physico-chemical changes which occurred in the curing of hides for storage.

In these days, when economic pressure led to a tendency to shorten the period of tanning and, therefore, to the use of tans which penetrated rapidly into the hide, the experimental error in working, for the practical tanner, had become increasingly less. In the old days the acid—which must be present in tan liquors—was obtained by allowing the liquors to ferment under the action of yeasts, which grew freely on the surface and, by decomposition of the tannins, produced organic acids in the liquor. This method was wasteful, both in tannins and time. Scientific investigation, however, had led to the direct addition of acids to the tan liquors by the tanner.

It must not be imagined, however, that science was applied merely to increase output or decrease costs. The human side also came in. The problem of preventing anthrax among tannery workers had been the object of two years' important work. The trouble in disinfecting hides was that the anthrax spores were highly resistant to all ordinary methods of disinfection, and any drastic method led to very serious injury to the hides. As the result of research a method had been found by which infected hides in a tannery could be disinfected with certainty, without interfering to any great extent with the ordinary tanning process.

Agriculture and Sugar

In agriculture, which comprised such sub-divisions as bacteriology, botany, chemistry, entomology, etc., work of the following nature had been carried out: (*a*) increasing the yield per acre; (*b*) altering within limits the percentage of various materials or characteristics in the crop; (*c*) investigation of the attack of disease organisms and pests and the finding of insecticides and fungicides to preserve plants; (*d*) the discovery and cultivation of new raw materials.

The work in the first of these categories included the study of soil and its improvement and the manuring for a higher crop production. Fertilising to produce a larger crop was not such a simple or straightforward problem as might appear at first sight, since the fertiliser which might increase the crop might also introduce, or increase in the crop, a constituent undesirable to the industrialist. In malting barley—a raw material of the brewing industry—the amount of the "extract" varied inversely as the nitrogen content of the barley, while the diastatic power of the malt was directly as the nitrogen content. The brewer, therefore, required a barley of low nitrogen content, and his problem was to increase the yield per acre of the barley without raising its nitrogen content. Experiments had shown that by using 1 cwt. of sulphate of ammonia per acre a larger crop could be obtained of barley suitable for brewing. One advantage of this fertiliser was that the greatest increase in yield was obtained in years when the crop was small and the least in years when the crop was abundant, so that it tended to even up the yield per acre. Muriate of ammonia was another fertiliser which gave a grain of low nitrogen content and increased the yield per acre.

With regard to the sugar industry, he said that about thirty years ago the Java Sugar Growers' Association had formed a research department, the funds being obtained by making an annual charge of 5s. per acre under sugar cultivation by its members; this represented an income of £100,000 per annum. Among the benefits resulting from the establishment of this station was the new cane sugar plant termed 2878 P.O.J., which had a larger sugar content and gave a greater yield per acre than any of the existing varieties grown on the island. Moreover, the plant did not require to be reared in the high lands and then transplanted to the sugar fields. He understood that the increased yield per acre of this new cane amounted to about 30 per cent. In the beet sugar industry, by a careful study of the beet, it had been possible to raise the sugar content from 11 to about 18 per cent. As chlorophyl played an important part in the production of this sugar, it was no surprise to find the ratio of tops to roots had largely increased. Investigation had also shown that nitrogenous fertilisers deepened the colour and increased the size of the leaves, whilst reducing the weight of root and the sugar content per 100 parts of leaf, and that full growth of the sugar beet could not be obtained unless sodium, and perhaps magnesium and chlorine, were supplied to the plant.

Other Fields

In the building trades science was being used to account for various phenomena. Serious cracking had occurred in breeze blocks formed by cementing together particles of furnace clinker with Portland cement, and used for the construction of internal parting walls. Investigation had shown that the trouble was due to unburned or partially burned coal in the clinker. All the breeze blocks did not disintegrate in this way, however, although unburned coal was present in the clinkers used, and it was shown ultimately that it depended upon the kind of coal present; the defect occurred if clinkers made from coals which were liable to spontaneous combustion were employed. Again, new quick-setting cements had been developed, and the setting of existing cements accelerated, either by the inclusion of accelerators or by the employment of finer particles. Work had also been carried out in connection with putty and the "bloom" of varnish.

With the development of X-rays and ultra-violet rays, another scientific instrument had been placed at the disposal of industry. The X-ray was used in the manufacture of patent leather, the object being to toughen the varnish medium so that it formed a hard, bright surface that would remain pliable. The application of this medium was being extended to artists' colours. He believed it was correct to say that there had been no new medium offered to the artist for over a thousand years.

In the rubber industry, ultra-violet rays might be used for checking the purity of zinc oxide, lithopone, oils, accelerators, etc., and for the detection of errors in mixings due to mistakes in the incorporation of the ingredients. Changes such as those produced by natural and artificial oxidation and ageing could also be detected rapidly and systematically followed. In certain cases this method of analysis was useful where ordinary methods failed, as, for example, in the detection of the addition of refined olive oil, soya bean oil and other adulterants to the natural olive oil. Metallurgy and the oil industries were others in which science in all its branches was playing an increasingly important part.

For the work done on hydrogenation and dehydrogenation of many organic compounds under catalytic conditions, industry was indebted to Sabatier and his co-workers, who had thoroughly investigated the chemical aspects of the changes involved. As the result of these investigations, industries had come into existence, and works had been erected, for the production of hard fats by the hydrogenation of unsaturated fats and fatty acids, the manufacture of synthetic butyl alcohol, decalin, tetralin, cyclohexanol and hydrogenated benzols, with their derivatives, many of which were useful in industry.

The Board of Directors

Industry, the President concluded, must make proper use of research. "Research" was a much abused expression, and the industrialist had often expected more from research than could possibly be obtained under any circumstances. Science had been used in the past in the way doctors were used—*i.e.*, it was called in when it was too late to do anything. He pleaded that science should be a fundamental part of industry. All this seemed to show that it was essential in modern industry that there should be scientific representatives on the boards of companies, in whom their non-scientific colleagues had sufficient confidence. We must not blame the industrialist, however. In the past the industrial director had suffered much from the scientific side, simply because the scientific man had not been sufficiently interested in the financial or commercial aspect of business. After all, every phase of a business must be represented on the board in order

to ensure a proper balance between the commercial, the financial and the scientific sides, each with confidence in the other, so that prompt decisions could be made.

High Pressure Equipment

Plant at Teddington Laboratory

On Friday afternoon a paper by Mr. Harold Tongue, on "The High Pressure Chemical Engineering Equipment of the Chemical Research Laboratory, Teddington," was read and discussed.

The President recalled that in his presidential address he had made reference to the enormous debt which the country owed to its research departments. He added that it was his personal belief that it was only just beginning to be understood by the financial and industrial interests, and he was convinced that when they were thoroughly understood there would be available as much money as was wanted.

Mr. Tongue stated that one of the most important developments in industrial chemistry of recent years has been the synthesis of fundamental chemical products by means of high pressure catalytic processes. When the first portion of the Chemical Research Laboratory, Teddington, was opened, late in 1925, it was realised that high pressure catalytic syntheses offered a fruitful field for research, and accordingly work on this subject was commenced early in 1926.

For the first two years the work done was more or less of an exploratory character, in order that the technique of such syntheses could be acquired on the production of methyl alcohol from carbon monoxide and hydrogen at pressures of 200 atms. and converter temperatures of 400° C.

The high pressure chemical engineering equipment of the Chemical Research Laboratory comprises: (1) A low pressure gas storage system; (2) a high pressure compression plant; (3) a high pressure gas storage and distribution system; (4) a battery of high pressure autoclaves and auxiliaries; (5) one high pressure "flow through" type catalytic apparatus, and three high pressure catalytic circulatory converter systems; (6) a high pressure hydraulic testing plant. A detailed description of each of the units in the plant was given, and Mr. Tongue went on to say that undoubtedly the first problem facing the designer of high pressure plant is to determine the value of stress which can be borne indefinitely without plastic deformation of the fundamental parts of the equipment.

Hydrogen Penetration

That the penetration of hydrogen under conditions of high pressure and temperature is of importance will be realised from the report of an investigation carried out by the National Physical Laboratory upon one of the Bergius bombs of the coal hydrogenation plant at H.M. Fuel Research Station. It was found that 100 grams of the steel wall of the bomb contained no less than 180 ccs. of hydrogen, and further, this hydrogen penetration was accompanied by an embrittlement of the steel. All the vessels described are regularly and thoroughly inspected, and up to the present no definite "creep" has been recorded. To provide a comparative study of molybdenum steels and austenitic steels with regard to stability at high temperatures and resistance to penetration of hydrogen, 2-in. and 1-in. bombs were made of V 30 "Vibrac" steel, supplied by the English Steel Corporation, Ltd., and a 1¼-in. bomb was made of "ERA. C.R.1" alloy, supplied by Hadfields. All these bombs are working under similar conditions, that is the study of the interaction of carbon monoxide and hydrogen at temperatures of 350–425° C.

The plant has been at work for over 2,500 hours, during the past two years. If due care is exercised, it can be definitely stated that high pressure plant of the type described need not necessarily cause any more trouble than equipment working at a pressure of a few pounds per sq. in.

The Discussion

Dr. Geoffrey Martin said in the old days the chemist had worked with glass test tubes and beakers, at very limited temperatures—360°C. was almost the limit—and at very limited pressures. The modern chemist, however, carried out reactions with the greatest ease at pressures of 20,000 lb. per sq. in., and there was not the slightest doubt that out of this type of work a new chemistry would develop. The work referred to in the paper seemed to him to be very dangerous. It was disconcerting to hear that when hydrogen was passed through the tubes it disintegrated the metal and made it brittle. Reference had been made to lubricating oil, and he asked if there were not danger that, owing to the presence of oxygen and lubricating oil, explosions might occur in the bombs themselves. With regard to oxy-acetylene welding, he recalled that some months ago he had had a number of iron tubes welded, and had thought, on inspection of the tubes, that the welder had made a good job of them. Six months later, however, when the tubes were tapped with a hammer, they had all broken. That indicated that, unless welding was carried out properly, it was very dangerous. No doubt it would be done properly, but it was one of those processes which required to have a very good technique.

Mr. A. B. Goggs, discussing the 2-in. bomb referred to in the paper, which, he understood, was used for hydrogen and carbon monoxide combinations to produce methanol, said he was somewhat surprised by the statement that after approximately 300 working hours the bore of the bomb was skimmed out and the metal was found to be apparently unchanged. In that respect, Mr. Tongue had been rather lucky, because one of the difficulties of methanol manufacture was the formation of iron carbonyl.

Debt to the Engineer

Dr. R. Taylor (Chemical Research Laboratory, Teddington) dealt with some of the experiments carried out in that part of the plant at Teddington which was designed for the study of catalytic reactions with carbon monoxide at high pressures and temperatures. With the operation of such a plant the chemist had had to learn much from the engineer, since in apparatus of this type no liberties must be taken which might imperil the lives of those around. He emphasised how much the success of such research depended on the interested co-operation of the engineer, and how much he and his fellow chemists appreciated the work that Mr. Tongue and his engineering staff had carried out at Teddington.

Professor G. T. Morgan, F.R.S. (Director of Chemical Research at Teddington), discussing the origin and objective of the work, said it had been felt by the Department of Scientific and Industrial Research that it would be in the national interest to have a group of chemists efficient in the highly complicated technique of high-pressure chemical reactions, and with that object in view a commencement was made, in January, 1926, in the erection of plant such as Mr. Tongue had described, and in the study of certain chemical reactions. It was decided to commence by studying the interactions of carbon monoxide and hydrogen. That particular combination was adopted rather than the simpler nitrogen and hydrogen condensation, because in the latter case one could expect to obtain only one compound (ammonia), whereas from carbon monoxide and hydrogen one might obtain an almost infinite variety of substances, or at any rate a very great number, by modifying the catalyst. So far all the alcohols produced were primary alcohols. In addition, there had been evidence of aldehydes, including formaldehyde, acetaldehyde, propaldehyde and n-butaldehyde, and quite probably the iso compound. Acids also had been identified. Commenting on Dr. Martin's reference to the danger of high-pressure experiments, he said that although the work had been carried on at Teddington for more than four years, there had never yet been a serious accident there, and that fact spoke very highly for the care which had been bestowed upon the work by Mr. Tongue, and by his predecessor, Mr. Hedley.

The Annual Dinner

The annual dinner of the Institution took place at the Hotel Victoria on Friday evening, when those present, besides the President, included: Viscount Leverhulme, Sir Josiah Stamp, Dr. Frank Smith (Department of Scientific and Industrial Research), Dr. H. Levinstein (President of the Society of Chemical Industry), Sir Alexander Gibb, Miss E. M. Reavell, Lady Stamp, Sir James Calder, Sir Thomas and Lady Purves, Mrs. F. E. Smith, Sir Henry Lyons, Sir William and Lady Jarratt, Sir Fredc. L. Nathan, Sir Robert and Lady Robertson, Sir John and Lady Russell, Prof. H. E. Armstrong, Mr. H. and Mrs. Ballantyne, Dr. G. W. C. Kaye, Mr. J. F. Ronca, and representatives of many learned societies.

Cleaning of Acid Stills and Tanks

Precautions Against Poisoning and Explosions

We give below the substance of a memorandum which has just been issued by the Factory Department of the Home Office (Form 814, H.M. Stationery Office, 8 pp., 2d.) on the cleaning or repairing of oil and acid stills in tanks and factories.

MANY fatal accidents have occurred during the cleaning preparatory to, as well as during, the repair of stills, tanks, drums, etc., which have contained material giving rise to vapours and gases. These accidents have been due either to explosion or to poisoning by vapours or gases present in the vessels; in some cases, both these risks may exist at the same time.

Explosions have been due either to inflammable vapour given off by the light oils, etc., stored in the tanks or from the sludge left after the liquid has been removed and, in the case of acid tanks, from the presence of hydrogen gas given off by the action of the acid on the metal of the tank.

As a rule, the ignition of inflammable vapour has been caused by the use of a naked light or by sparks mechanically produced by steel or iron tools or dip rods; it is therefore desirable that implements of this kind should by made of gun-metal, copper, "Monel" metal, aluminium or nickel. Explosion may not always be the result of actual sparking; for instance, carbon bisulphide has a very low temperature of ignition and contact of the vapour with a warm lamp, although completely enclosed, may cause its inflammation.

No person should be allowed to bring near or put into any still, tank, or other vessel, any naked light, or to attempt to use any dip rod or metal implement which may cause sparking, unless and until such a vessel has been tested by a competent person and certified by him to be entirely free from inflammable vapour and gas. For the inspection of such plant only fully enclosed certified lamps or test lamps should be used.

Poisoning

Cases of poisoning have arisen through persons entering vessels which have contained benzol (C_6H_6) or other volatile poisonous vapours, or in the case of acid tanks and tank wagons, by arseniuretted hydrogen evolved from acid rich in arsenic, reduced by the hydrogen evolved by the action of the acid on the metal of the tank, or on an iron or zinc implement which has been used in the cleaning process.

In order to maintain good ventilation in a tank during working operations, a jet of compressed air, or other efficient means of ventilation should be kept going continuously. If a portable electric blower is used it must be kept at such distance that there is no risk of ignition from electrical sparking. Where possible, storage tanks should be provided with large top and bottom openings so that cleaning may be done from outside and in order that there may be a free flow of fresh air through the tank. Such ventilation does not do away with the need for breathing apparatus and lifebelts, if there is any risk from noxious vapour.

General Methods of Cleaning Vessels

Whenever a still for inflammable, corrosive or toxic liquid has to be opened for examination or repair, it is necessary to clean it out in order to remove all dangerous material, so that the work may be carried out in safety. The following procedure summarises the best methods at present in use. Variants of this method, such as are used by some firms, are permissible, provided that the underlying object of completely removing all dangerous material is fully achieved. The contents of the still should first be run out while still hot. All inlet pipes should then be disconnected and be blanked off with a metal blank having a large indicator lip, the blank being bolted with a properly made joint. The mere closing of cocks and valves must not be considered a satisfactory isolation. After this, different treatment must be adopted according to the type of material left in the still.

(a) *Stills for benzol and similar steam-volatile products* are best dealt with by continued steaming or the introduction of sufficient water and boiling, until the condensed water is free from oil or spirit, thus cleaning both still and column.

(b) *Stills for products with less volatile residues.*—If valuable material which is not readily volatile, corrosive material, or material which must be recovered, is present in the residue, repeated washing with successive small quantities of water, together with steaming by means of a perforated steam pipe lying along the bottom of the still to disturb any solid or pitchy matter, may precede the above treatment. In this case the condensed water must be reasonably free from volatile material. It may be necessary in special cases to use chemical or other solvents or neutralising agents to get completely rid of the dangerous material.

Procedure with Tar Stills

(c) *Tar and Pitch Stills.*—The following is the procedure approved by the Association of Tar Distillers and Group V. of the Association of British Chemical Manufacturers, after consultation with the Chief Inspector of Factories, Home Office:—The decision to open a tar still for entry should be made, and the instructions issued, before the charge has been run off. If a cold still is to be opened for cleaning, then if the mechanical arrangements make it possible for a fresh charge to be run, this should be done, and the procedure should then be as for a hot still. Immediately the charge has been run off, the still should be blown through with live steam, and afterwards opened and the steaming continued until the vapour has been driven off. The terms of Chemical Works Regulation No. 19 should be observed, and every pipe leading into the still should not only be disconnected, but also blanked off with a metal blank with a large indicator lip. The blanks should be firmly bolted with a properly made joint. The mere closing of cocks and valves should not be considered a satisfactory isolation. In addition, not only should the still be allowed to become cool, but suitable steps should be taken to ensure that the brickwork beneath is quite cool, so that a properly prepared still may not later be rendered foul.

If, for any reason, tar and pitch stills cannot be dealt with as hot stills, then they should be treated as in paragraph (d). In the case of tar and pitch stills which have been properly prepared as above, and which are properly ventilated according to the methods described below under paragraph (d), scale or semi-coked pitch may be removed by men who need not be required to wear breathing apparatus, provided that the vessel has been certified as safe to enter.

(d) *To prepare a cold still, tank or other vessel* for cleaning, any liquid contents should first be drained off. Water should then be run in to a depth of about one-third of the vessel's height, and steam should be blown through a perforated pipe which reaches to the bottom, and along the floor of the vessel, the object being to disturb any sludge that may be present. The steaming should be continued for a minimum of three or four hours, and for a still longer time if all odours of the inflammable or other noxious material have not disappeared.

To clean tank wagons which have been used for the transport of acid, they should be filled with water and agitated with compressed air for 15 minutes to form a suspension of the sludge. The removal of the heavier portion of the sludge on the bottom should be done by a jet of high pressure water, washing it straight through. The tank should then be filled with water and the last traces of acid neutralised with soda. The tank should be inspected by a competent person and certified free from all sources of fumes before passing forward for repair or filling. To clean acid storage tanks, all pipes should be blanked off and the sludge removed as above by high pressure water directed from the top manhole, aided by compressed air. The tank is then filled with water, neutralised and inspected in the same way. If it is necessary for any person to enter before the sludge is removed, a safety helmet and lifebelt must be used.

Drums, etc., which are not Entered

When it is unnecessary to enter the vessel, it may be possible, under exceptional circumstances and where facilities are available, to ensure safety during repair by injections of carbon dioxide or other inert gas, provided precautions are taken to ensure that sufficient inert gas is used and that it is not allowed to leak unduly while the repair operations are being carried out, and that a relief is provided to prevent bursting of the vessel due to heat expansion of the contained

gas. This method is subject to many limitations and would have to be used with great caution.

Barrels or drums are best cleaned by thorough washing and steaming immediately before repair. In the case of very small vessels, it may be practicable to fill the internal space with an inert material, such as sand, during the operation of a repair, and afterwards to remove this material by swilling with water.

After the still or vessel has been thoroughly steamed it should be inspected and certified free from fumes by a competent person using the Redwood vapour lamp and, if it is intended that persons should enter the still, lowering a cage of white mice. Men entering the vessel to remove the sludge, deposit, tar or scale, should wear approved breathing apparatus with an inhalation tube, and they should also wear a belt provided with a life line, the unattached end of which is to be held by a man outside the vessel. After sludge, scale and deposit have been removed, the atmosphere of the vessel must be tested by introducing a cage of white mice, and further steaming must be carried out if it is shown to be necessary, before men are allowed to enter unless they are wearing approved breathing apparatus.

The Government and Research

Historical Survey at Manchester

THE annual general meeting of the Manchester section of the Society of Chemical Industry was held on Friday, April 4, Dr. R. H. Pickard presiding. Following the reading of the annual report, Mr. C. M. Whittaker drew attention to the fact that the section included in its area probably one of the most important centres of textile and dyestuff chemists, and did not appear to cater adequately for their requirements in the matter of papers. He hoped that the sectional committee to be appointed for the ensuing year would make some provison in that respect, as it would almost certainly lead to an increase in membership.

Messrs. H. Browning and H. C. Clanahan were appointed auditors. There were nine nominations for the six vacancies on the committee, and, after a ballot, Messrs. F. D. Farrow, F. A. Mason, W. J. S. Naunton, D. U. Paul, F. H. Terleski and J. C. Withers were elected.

Kings and Chemists

"The Attitude of the Government towards Scientific Research" formed the subject of an address by Major A. G. Church, M.P. The attitude of the British Government to the higher teaching of research in science, he said, had been one slow and tentative development through compulsion and expediency to action and organised assistance. The need for explosives as long ago as the fourteenth century led the monarchs of the day to give encouragement to their chemists, and this tradition had been maintained through the centuries, although it was not until the second decade of the last century that there was a chemist attached to the Royal Arsenal at Woolwich.

The work of the Board of Agriculture was founded much as a learned society in 1793, and in 1802 Sir Humphrey Davy lectured on the elements of agricultural chemistry.

The Government interest in research had been proved by such things as the creation of the Development Commission in 1909. In public health there was the formation of the Medical Research Council in 1913. The speaker also cited the cases of the Department of Scientific and Industrial Research in 1915, and the Committee of Civil Research in 1925.

Major Church dealt with State expenditure in research work, and, after enumerating the Estimates, pointed out that the actual Government expenditure was about £3,500,000. "I only want to remind you," he added, "that it is half the cost of a Hood or a Nelson." The universities grant was again increased, to £1,830,000, which meant that over £250,000 in addition was being devoted to the universities in the hope that university staffs as well as buildings might receive some benefits.

In Other Countries

Turning to other countries, the United States were spending 15 millions sterling per annum upon industrial research, the National Canners' Association £50,000, the National Lime Association £20,000, the Portland Cement Association £20,000, the General Electric Company £650,000, the Du Pont de Nemours Company (Chemicals) £400,000, General Motors, £200,000, Bell Telephones Co. (with associated companies) 3 millions, and in connection with one firm alone employing 1,800 fully qualified scientific research workers, the Goodrich Tire Company £300,000, and the Eastman Kodak Company £200,000. The Bureau of Standards for 1929 spent 2,752,000 dollars, and the Bureau of Mines 3,304,000 dollars, while there were a great many other bureaux in regard to which there were no detailed figures. The National Research Council had an appropriation based upon the income derived from the Carnegie Foundation and the Rockefeller Foundation of 849,715 dollars. It was somewhat difficult to arrive at any accurate figures with regard to Germany, but the following items could be stated. M. 2,426,000 was granted to the Kaiser Wilhelm Gesellschaft zur Förderung der Wissenschaften, M. 950,000 for the erection of Research Institutes controlled by the Gesellschaft, M. 8,000,000 for the Notgemeinschaft der deutschen Wissenschaft, while in addition it was estimated that about 200 million marks per annum were contributed to scientific institutes by the States and municipalities. There was no information in regard to expenditure on research by industrial organisations, but the I.G., before it was amalgamated with the Badische Company, employed about 2,000 research chemists.

University Criticised

During the course of the discussion which followed the lecture, Mr. F. Scholefield expressed his regret that so far it had not appeared to be possible to establish a closer relationship between the University of Manchester and the British Cotton Industry Research Association, of which the chairman of the Section was the director. He thought that men who took a three or four years' course in pure science at the University should be permitted the opportunity of acquiring the kind of training which such an Association could provide in the application of science to the problems of industry. It ought to be possible for a graduate to take a higher degree by acquiring training under the auspices of the Association on the ground of carrying out research work, and even, if need be, in the factories and works of private enterprise.

The Chairman said that his distinguished predecessor in the chairmanship of the section proposed to the Manchester University that they should recognise the work done at the Shirley Institute for the purposes of obtaining higher degrees at the University, but the request was not acceded to.

Major Church said that the United States were spending an enormous amount of money on research in regard to the productive side of the cotton industry, while the figures in regard to Japan for the future were likely to be extremely interesting. Germany was spending about £50,000 per annum on its textile industries, which was not a great sum. He was amazed to hear from Mr. Scholefield that the University of Manchester, of all places, had refused to allow its graduates to take up a research course in one of the foremost industrial research associations in the world in regard to a thesis for its doctorate. He could only regard it as the most short-sighted course he had ever known adopted.

More Business at the B.I.F.

Chemical Section's "Home" Inquirers

THE *Board of Trade Journal* has just published a review of results of the 1930 British Industries Fair. "It was generally agreed among exhibitors and officials," it is stated, "that this year's Fair was one of the most successful ever held. The depression in trade in the country generally did not affect attendances, which were the highest ever recorded. All sections reported more business, and the number of new accounts opened and inquiries likely to lead to business in the future also compared favourably with previous years."

A summary of the report from the Chemical Section at Olympia states that chemical exhibitors were kept very busy with inquiries, particularly from potential customers at home, the impression being that there were fewer visitors interested in this section from overseas. The Combine's inquiries easily exceeded last year's total number in the first few days. Good educational use was made of the Fair each morning by inviting parties of chemical students from London University and London technical colleges to tour the section under expert guidance.

Chlorine in Flour

The Detection of Small Quantities

At the meeting of the London Section of the Society of Chemical Industry, held at Burlington House, Piccadilly, on Monday, a paper, by Dr. D. W. Kent-Jones and Dr. C. W. Herd, was read on "The Detection and Estimation of Small Quantities of Chlorine in Flour." It was pointed out that flour bleaching has been carried on by the milling industry for over 20 years, and that whilst there is a public preference for bread to be white rather than creamy it seems likely that the practice will continue. Further, no harm had ever been traced to the use of bleaching, although a strong prejudice against it existed in the minds of some people.

Nitrogen Trichloride

In the early days practically all the bleaching was done with nitrogen peroxide, but since the war the use of chlorine has become prevalent. Chlorine alone, or with ½ per cent. of nitrosyl chloride, is used at the rate of ½ oz. to 2 oz. per sack of 280 lb. of flour. The most modern practice, however, is the employment of chlorine in the form of nitrogen trichloride. In this form it appears to be considerably more active and effective than ordinary chlorine, and beneficial baking results, together with a strong bleaching, can be obtained with as small quantities as 2 to 5 grammes per sack of flour, or something like one-eighth of the quantity of chlorine which used to be employed. Of recent years increasing amounts of flour are being treated by this reagent, and the authors suggest that nothing should be added to flour that cannot be detected, if desired. The experience of cereal chemists, however, has been that the minute quantities of chlorine introduced by the modern nitrogen trichloride process are extremely difficult to detect with the methods hitherto employed, and they therefore have devised a new procedure.

Method Described

The authors' method is as follows: 500 grammes of flour are mixed with 700 c.c. of petroleum ether (40 to 60 deg. C.), and well shaken intermittently for about half an hour. It is then allowed to stand overnight. In the morning the petroleum ether is filtered off through a Buchner funnel on an ordinary water pump. The residue is hydrolised with 20 c.c.s of 4 per cent. alcoholic soda, the hydrolysis taking place on a water bath and the contents being taken down to dryness. When completely evaporated, the residue, in a platinum bowl, is placed in the mouth of a muffle furnace at about 500 deg. C., or over a gentle flame, and the mass is just charred. It is cooled and 20 c.c.s of 1 : 1 HNO_3, free from chlorine, is added. The nitric acid extraction is repeated, and then three times with 20 c.c.s of distilled water. All these extracts are poured on to the filter paper successively, the filter paper and bowl then being dried at 100 deg. C., and the paper ashed in a muffle furnace at 500 deg. C., or over a flame to a white ash. It is then dissolved in a few drops of the dilute nitric acid and added to the extracts. The combined extracts and washings are evaporated down to about 30 to 40 c.c.s, and there are added 5 c.c.s NaCl solution and 10 c.c.s $AgNO_3$ solution. The whole is heated to boiling to coagulate the silver chloride, which is either filtered off through nitric acid washed papers or thrown down by centrifuging. To the clear solution thus obtained, 2 c.c.s ferric-indicator are added and the excess of $AgNO_3$ is titrated with ammonium thiocyanate solution, a sharp end point being obtained.

The authors emphasised the importance of keeping the nitric acid at the strength indicated, and pointed out that by using this method flours known to be untreated with nitrogen trichloride, or chlorine in any form, have always given under one part per million of chlorine. Anything over two parts per million was a clear indication that the flour had been treated with chlorine, but the authors considered that while it can be taken for granted that flours containing under one part per million are untreated it would be unwise to draw any conclusion when the results came between one and two parts.

Small Chemical Works Closing in Bolivia

For many years past numerous small factories manufacturing nitric and sulphuric acid operated in the neighbourhood of Cochabamba, Bolivia. During the past 10 years they have been slowly disappearing, and recently there has been considerable agitation in Bolivia for legislation to protect the remaining small factories against foreign competition.

Extracting Oil from Seed

Mr. A. H. Emery's Paper at Liverpool

At the annual meeting of the Liverpool section of the Society of Chemical Industry, officers elected were:—Chairman, Dr. E. L. Peck; vice-chairman, Professor C. O. Bannister; hon. treasurer, A. E. Findley; hon. secretary, E. Gabriel Jones. Representative on Chemical Engineering Group, W. Ramsay Sibbald. The vacancies on the committee were taken by: Colonel E. Briggs, Professor I. M. Heilbron, Professor T. P. Hilditch, F. S. Thurston, E. T. Williams.

"Methods of Extracting Oil from Seed" was the title of a paper read by Mr. Arthur H. Emery, of Joseph Bibby and Sons, Ltd. The occurrence of oil in plants, he said, was practically limited to the fruits, and in the majority of cases, the seeds or seed-kernels, were the source of the oil. They, as the raw material for the oil mills, came from all the corners of the earth, and varied in many ways.

Prior to the extraction of oil, the seed had to be rolled and different methods had to be adopted for different materials depending on the size and the oil content of the seed. Large seeds, such as palm kernels, ground nuts, etc., had to be passed through kibbling machines, which cut up the seed into small fragments prior to rolling. The object to be achieved in the roller house was to break up every oil cell in the seed, if possible, and yet at the same time keep the particles of seed as large as possible.

Before pressing, the seed had to be cooked to coagulate the albuminous material in the seed and to raise the temperature of the oil so that there would be a good separation of oil from seed when pressure was applied. In the pressing there was first a period of low pressure, about 350 lb. per square inch, on a cake 32 by 13 in., 700 lb. on a 16 in. ram. When the cake had set, high pressure was applied. This was varied according to the material being crushed to about 1,870 lb. per square inch; 4,000 per in. on a 16 in. ram. The pressure was supplied from hydraulic ram pumps, using the oil which was being crushed as its liquid. This prevented contamination of the oil. The residual cake from this process contained anything from 4½ per cent. to 10 per cent. of oil, depending on the material.

Solvent Extraction

With regard to solvent extraction, Mr. Emery said the great advantage of the solvent process over the pressing process lay in the fact that the labour charges were less and that the oil contents were lower in the resultant meal. A good deal of prejudice existed at one time against this method of oil extraction, probably due to the inferior solvents used during the war. Records showed that the boiling point of war petroleum spirit had a range between 55° C. to 200° C. With a high boiling point such as that, it would be very difficult to remove the last traces of solvent from the oil and the meal. He thought, therefore, they must regard that prejudice as another legacy of the war. Again, petroleum spirit was regarded with some misgiving owing to its inflammability. In a modern plant and with ordinary care this risk could be greatly reduced, almost to an ordinary fire risk.

The loss of solvent on a plant using petroleum spirit was somewhere in the region of 2½ to 3 gallons per ton of seed extracted. It was very difficult to state where these losses took place. Some were mechanical losses due to imperfections in the plant. Some might be due to destructive distillation. Attempts had been made to analyse these losses, but so far without much success. The solvent extraction process had the great advantage over the pressing method of its low oil contents. Practically every seed could now be extracted so as to leave only 1 per cent. of oil in the meal.

Assay of Coal for Carbonisation

The assay of coal for the purposes of carbonisation is dealt with in a third paper (No. 24) issued by the Department of Scientific and Industrial Research. This relates to a modification of the apparatus which is intended to make it more suitable for testing coals to be used in gas retorts. The yields obtained from any given coal in gasworks practice depend on the type of retort used and the method of working, so that the factors correlating the assay yields with those obtained in commercial practice vary with the type of retort, extent of steaming, size of coal, and, to some extent, with the nature of the coal. Correlation factors are given for a number of different conditions, indicating how these factors vary.

Society of Chemical Industry

Preparing for Birmingham Meeting

THE annual meeting of the Birmingham and Midland Section of the Society of Chemical Industry was held at the Chamber of Commerce Building, Birmingham, on Friday, April 4, Mr. W. A. S. Calder presiding. Dr. E. D. Mason was appointed chairman; Mr. A. W. Knapp, Mr. W. R. Barclay, and Mr. W. A. S. Calder vice-chairmen; and Mr. W .T. Collis and Mr. G. King were re-appointed hon. treasurer and hon. secretary, respectively. To fill vacancies on the committee the following were elected: Professor W. N. Haworth, Mr. R. Maudsley, and Dr. S. R. Carter (nominations from members of the section), Mr. Calder and Mr. A. J. Broughall (representative of the chemical engineering group). Dr. Fox was re-appointed hon auditor.

The annual report of the section (presented by Mr. King) stated that the Council of the Society of Chemical Industry had accepted the invitation of the Birmingham and Midland Section to hold the annual meeting at Birmingham from July 14 to July 19 and the committee had appointed an executive committee to draw up and carry into effect a programme suitable for the occasion. Members would be invited to a civic reception, to a reception at the University of Birmingham, a garden party at Bournville (Cadbury Brothers, Ltd.), and other functions at the invitation of the Reception Committee.

A Special Fund

Mr. King drew the attention of the members to a circular issued by Mr. E. D. Mason (hon. secretary of the Annual Meeting Finance Committee), pointing out that a special fund of over £2,000 was required. The fund was being raised by an appeal to manufacturers and others in the Birmingham district interested in the chemical industry to become guarantors for a definite amount, and although a substantial sum of £1,500 had already been promised, the active and practical support of the members of the Society was essential.

An address on "Some Little Known Causes of Stone Decay" was given by Mr. A. R. Warnes, who dealt in particular with the effect of sea spray on Portland stone. Some stone preservatives were also responsible in the course of time for stone deterioration and decay. Mr. Warnes said he recently investigated "pitting" of Bath stone in a memorial church. For twenty years it was in perfect condition, but after a quarter of a century mischief to the stone surface became apparent. Careful examination revealed the presence of magnesia and it was then recalled by the church authorities that early on the stone was dressed with magnesium silico fluoride. In the stone he found magnesium sulphate. It was a mistake to use any dressing material which gave off by-products. Wax in preservatives, improperly applied, led to trouble; crystallisation might arise and water caused inter-facial tension.

Mr. J. C. Mann, Mr. D. W. Parkes, Mr. W. A. Benton and Mr. G. King took part in the discussion.

Society of Public Analysts

Determination of Titanium as Phosphate

AN ordinary meeting of the Society was held at the Chemical Society's Rooms, London, on Wednesday, April 2, the President (Dr. J. T. Dunn) being in the chair.

Certificates were read for the first time in favour of L. S. Davis, A. Smith, B.Sc., A.I.C., and S. B. Tallantyre, B.Sc., F.I.C.; and for the second time in favour of C. A. Adams, B.Sc., F.I.C., Janet W. Brown, Ph.D., A.I.C., and J. A. Reddie, F.I.C.

The following were elected members:—R. G. Baskett, B.Sc., H. C. L. Bloxam, F.I.C., C. McClellan Bottomley, B.Sc., J. Butler, B.Sc., F.I.C., R. Ellison, A.M.C.T., G. N. Grinling, F.I.C., A. Houlbrooke, M.Sc., A.I.C., P. H. Jones, F.I.C., R. Mallinder, S. N. H. Stothart, B.Sc., Ph.D., and H. Threadgold, B.Sc., A.I.C.

Abstracts of Papers

"The separation of cadmium and copper in spelter and zinc ores by internal electrolysis" was dealt with in a paper by Ella M. Collin, B.Sc., A.I.C. It was shown that the method of "internal electrolysis" devised by Sand can be used for the rapid separation of cadmium and copper in spelter and zinc ores. The most satisfactory method is to deposit the copper first from a sulphate solution containing a small excess of sulphuric acid, to dissolve the copper in excess of nitric acid, and to electrolyse the solution at 70°, when an excellent deposit is obtained. The original sulphate solution is re-adjusted with ammonia, sulphuric acid and sodium acetate, and the cadmium electrolytically deposited. The anodes are of zinc, and a 5 per cent. solution of zinc sulphate acidified with sulphuric acid is used in the anode compartments.

Mr. A. F. Lerrigo, B.Sc., F.I.C., in a paper on "Routine detection of nitrates in milk," stated that the statement of Kohn-Abrest and Kawa-kibi that cows' milk may contain more nitrate than drinking waters had not been confirmed, although all specimens of human milk examined gave a positive reaction for nitrates. A modification of the diphenylamine test was recommended as a rapid routine test for nitrates in milk, and had been found capable of detecting the addition of 5 per cent. of a water containing about 0·5 part of nitric nitrogen per 100,000. The test was regularly applied in Birmingham to all samples of milk containing less than 8·5 per cent. of solids-not-fat.

In a paper on "The determination of titanium as phosphate" Dr. J. C. Ghosh explained that the prepared ore or clay is fused with sodium carbonate, and the mass treated with boiling water, which dissolves aluminium and silica as sodium salts, leaving sodium titanate in the residue. This is hydrolysed and is then dissolved in either sulphuric or hydrochloric acid, and when boiled yields a precipitate of metatitanic acid. This is dissolved, the solution just neutralised with ammonia, and the titanium precipitated and weighed as phosphate.

The Use of Ethyl Petrol

Safety Recommendations

IN the interim report of the Departmental Committee on Ethyl Petrol, issued in July, 1928, the view was expressed that there were no good reasons for prohibiting the use in this country of that mixture as a fuel for motor-car engines, provided its distribution and use were suitably controlled, and this view is confirmed in the unanimous final report published last week (H.M. Stationery Office, price 1s. net).

In summarising their conclusions, the Committee state that the use of ethyl petrol as a motor fuel would not increase the proportion of particulate lead in the atmosphere of the streets to such an extent as to constitute a risk to the health even of that part of the population which is most exposed—namely, police officers on traffic control duty and drivers of motor and other vehicles.

In a properly ventilated garage there would be no danger to health from the exhausts of motor vehicles, or from the evaporation of ethyl petrol owing to spillage, and even in a badly ventilated garage the danger due to spillage would not be serious; but it is emphasised that whether or not ethyl petrol is used, the danger from carbon monoxide in an unventilated garage is very serious. The risk arising from the absorption of lead tetra-ethyl owing to contact of ethyl petrol with the skin is declared to be so small as to be negligible, and while the deposits from cylinder heads, etc., of cars using that fuel contain a high percentage of lead, the quantity and nature of those deposits are such as to make them of little significance to garage workers, if due regard is had to ordinary cleanliness. There is no danger to water supplies from the use of ethyl petrol.

The committee do not recommend any legislative action so long as the terms of the contract between the proprietors of the fuel and the distributors in this country secure the continued observance of certain precautions. These are:—

(1) That cans and pumps should be labelled to indicate the presence of lead in the fuel and to warn the user to avoid spillage and not to use the fuel for other purposes than motor fuel;

(2) That the fuel should be dyed as an additional check against its use otherwise than as motor fuel; and

(3) That the amount of lead tetra-ethyl in the fuel sold for ordinary commercial purposes should not exceed one part in 1,300 parts by volume or about one in 650 by weight.

From Week to Week

MR. W. B. LAWSON having resigned his directorship of Henry Gardner and Co., Ltd., Mr. D. O. Evans, a director of the Mond Nickel Co., Ltd., has been elected to a seat on the board.

THE VEREINIGTE GLANZSTOFF FABRIKEN, it is announced, have ceded their interest in the Aceta Co., representing 50 per cent. of the capital, to the I.G. Farbenindustrie, which thus holds the entire capital of the Aceta.

THE LIQUID AIR COMPRESSOR used by the late Sir William Ramsay from 1898 onwards for the investigation of the rarer inert gases in the atmosphere has been placed by the authorities of University College, London, on permanent loan at the Science Museum, South Kensington.

EXPORTERS OF DRUGS are reminded by a Home Office notice that Eucaine is subject to the provisions of the Canadian Opium and Narcotic Drug Act, 1929. Exporters should ascertain, before exporting, that the import has been licensed by the Canadian Department of Health.

AT THE ROYAL INSTITUTION general meeting on Monday, Sir Robert Robertson, who presided, announced that Dr. G. S. Newth had presented the spectacles worn by Faraday when carrying out his researches on glass. Miss Elizabeth Black, Sir James Devonshire, Sir Guy Granet, Mr. Norman Hart and Mrs. Gerta Schubeler were elected members.

TEES CONSERVANCY COMMISSIONERS, at their meeting on Monday, reported a draft agreement with Imperial Chemical Industries, Ltd., for an option to the company to purchase 267½ acres of foreshore at Port Clarence for the proposed construction of a large wet dock, together with the erection of chemical works, and also for the deposit of the company's waste material on the Tees tidal foreshore for reclamation purposes.

CHANGES OF ADDRESS: The London office of Daniel Adamson and Co., Ltd., turbine and boiler engineers, has been moved to Craven House, 16, Northumberland Avenue, W.C.2. —Telephone: Regent 1795; telegrams: Flangeseam, Westrand, London. Metropolitan-Vickers Electrical Co., Ltd., announce that from April 14 their Birmingham office address will be Wellington House, 39, Bennetts Hill, Birmingham.—Telephone numbers: Central 2801 and 2802; telegraphic address: "Multiphase, Birmingham."

THE COLEY ZINC PROCESS has made considerable progress, said Mr. Allan C. Macdiarmid (chairman), at the annual meeting of Stewarts and Lloyds, Ltd., and a complete reduction plant has been installed in England by the Zinc Manufacturing Company, a licensee of the N.C. Metal Company, and is running efficiently. The distillation of the product is being carried out at their own spelter works at Halesowen, near Birmingham, which have been leased to the Zinc Manufacturing Company, and the resulting spelter is being used in their tube works galvanising department, where it is proving itself satisfactory.

THE CHEMICAL AND METALLURGICAL CORPORATION'S shareholders on Tuesday received a circular from Mr. Frank Gielgud and Mr. Francis Moore, who consider that a shareholders' committee should be appointed "of persons whose stake in the company and qualifications to assist are on a somewhat stronger basis" than the committee proposed at the meeting convened by Mr. Alfred Barnard, on February 26. At the meeting of the company on April 16, therefore, they will propose the appointment of a committee consisting of Messrs. Frank C. Heley, F. C. T. Lane, Francis Moore, H. J. Morland, W. H. Tapp, and Edward Hooper.

CHILEAN NITRATE PRODUCTION for the year July, 1930–June, 1931, is estimated at 2,345,000 tons, and it is calculated that a consumption of about 3,200,000 tons would be required for that period to bring the world's supply at June 30, 1931, down to a normal figure of about 1,250,000 tons. The estimate of consumption for the year ending June 30 next is 2,400,000 tons. A central committee domiciled in London has been appointed consisting of a representative of the Chilean Government, the general European representatives of the Nitrate Producers' Association and four representatives of producers, and meetings are now taking place. It is hoped, states Ackman (London), Ltd., that as a result of their deliberations a scheme will be evolved that will increase consumption to absorb the surplus supplies.

THE CHEMICAL WORKERS' UNION (National Union of Drug and Chemical Workers) is holding its twelfth general meeting at Anderton's Hotel, Fleet Street, London, E.C.4, to-day and to-morrow (Sunday).

SCIENTIFIC RESEARCH in the cotton industry was dealt with by Mr. W. Kershaw, of the Research Department of the Bleachers' Association, Manchester, in a lecture to the London Section of the Textile Institute at the Clothworkers' Hall on Monday.

RECENT WILLS include: Dr. Samuel Barnett Schryver (60), of Bolton Gardens, South Kensington, London, S.W., Professor of Bio-Chemistry in the Imperial College of Science and Technology, formerly Demonstrator of Chemistry in Liverpool (net personalty £7,806), £7,987.

ACETIC ACID is on the prohibited list and perfumed spirits on the rationed list of the new Australian emergency tariff announced by the Federal Prime Minister (Mr. Scullin) last week. Goods despatched from the countries of export prior to April 4 are exempt from the prohibition.

THE PARTY REPRESENTING British employers which left Northampton on Saturday to study methods of factory management in Canada and the United States included Mr. J. Haye (deputy labour manager of Imperial Chemical Industries) and Mr. Peter Courtauld (Courtaulds, Ltd.).

A PAPER on Low Temperature Carbonisation, by Mr. T. W. Skilling, including an outline of the work of the Fuel Research Board in developing a retort to produce a smokeless fuel suitable for domestic use from bituminous coal, was read on Saturday before the Institution of Mining Engineers.

PROTECTION FOR THE CHEMICAL industry of India was referred to by Sir Purshotamdas Thakurdas in a recent speech in the Indian Legislative Assembly. Over a year ago, he said, the question was referred to the Tariff Board and the report was expected last October at the latest, but it had not yet been published. He did not wish to make uncharitable guesses as to the cause of the delay, but while the Government was making up its mind, factories had to close down.

THE UNITED STATES Senate has approved a Bill for governmental operation of the war-time power and nitrate plant at Muscleshoals, Tennessee River, Alabama. The Bill provides for the creation of a Muscleshoals Corporation with a board of directors of three members who would be appointed by the President to manage the plant. The board would be directed to operate plant for the experimental manufacture of fertilisers, the manufacture of fixed nitrogen and to sell power.

THE GERMAN NITROGEN agreement has been renewed for a period of seven years, with a proviso that it may be annulled by the members of the syndicate after five years. The syndicate comprises the five largest concerns interested in the industry, including I.G. Farbenindustrie (German Dye Trust), Kokswerke, and Chemische Fabriken. The German Dye Trust will receive an annual quota of 750,000 tons, while the Ruhr collieries will have a maximum quota for synthetic nitrogen, upon the completion of new and the extension of old plants, of 160,000 tons, as well as a quota of 91,200 tons a year for coke-oven ammonia, which brings their total quota up to 251,200 tons. The ratio of quotas of the German Dye Trust and the Ruhr collieries in the new German Nitrogen Syndicate respectively, therefore, works out at three to one.

THE SOCIETY OF GLASS TECHNOLOGY will hold its annual meeting in Sheffield on Tuesday next. At the ordinary meeting on Wednesday a resolution will be submitted proposing that the following persons who have done distinguished service in the advancement of Glass Technology shall be elected Honorary Members of the Society: Dr. Arthur L. Day (Director of the Geophysical Laboratory, Washington, D.C., U.S.A.); Sir Herbert Jackson, F.R.S. (Director of the British Scientific Instrument Research Association, London); Dr. Walter Rosenhain, F.R.S. (Superintendent of the Department of Metallurgy and Metallurgical Chemistry, The National Physical Laboratory, Teddington); Dr. Otto Schott (joint founder and director of the firm of Schott und Genossen, Jena, Germany); Dr. Eugene C. Sullivan (President, The Corning Glass Works, Corning, U.S.A.); Professor Gustav Tammann (University of Göttingen, Germany); Professor Morris W. Travers, D.Sc., F.R.S. (Professor of Applied Physical Chemistry in the University of Bristol).

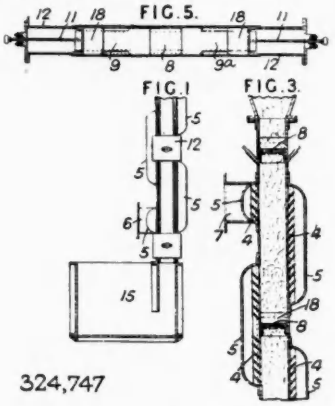
Patent Literature

The following information is prepared from published Patent Specifications and from the Illustrated Official Journal (Patents) by permission of the Controller to H.M. Stationery Office. Printed copies of full Patent Specifications accepted may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, at 1s. each.

Abstracts of Accepted Specifications

324,747. Treating Gases with Solids and Liquids. C. Cooper, D. M. Henshaw, and W. C. Holmes and Co., Ltd., Whitestone Iron Works, Huddersfield. Application date, November 21, 1928.

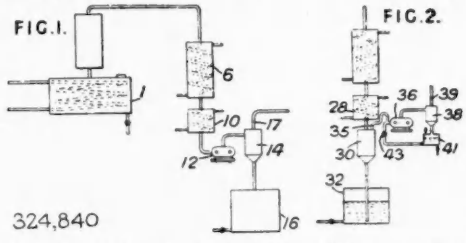
Gas is admitted to a tower through inlet 6, and is caused to take a zigzag path by means of partitions 8 and external



passages 5 connecting apertured portions of the walls, and is finally withdrawn at the outlet 7. The partitions 8 are valved or movable, so that the solid treating material may be moved in steps down the tower. Inclined deflectors 18 are provided, extending downwards from the end walls at each partition to guide the solid material toward the centre. The solid material is discharged through movable or valved elements 9, 9a in each partition, which are operated by handles 11 in side extensions 12 of the tower. The solid material is replaced by Raschig rings when the gas is to be treated with a liquid. A liquid seal 15 is provided at the bottom of the tower, in which tar is separated when fuel gas is treated.

324,840. Vacuum Distillation of Solids. R. W. James, London. From National Aniline and Chemical Co., Inc., 40, Rector Street, New York. Application date, March 4, 1929.

Naphthalene, phthalic anhydride, anthracene, β-naphthol, and similar normally solid materials are distilled in vacuo and the vapour condensed to liquid. The vacuum is main-



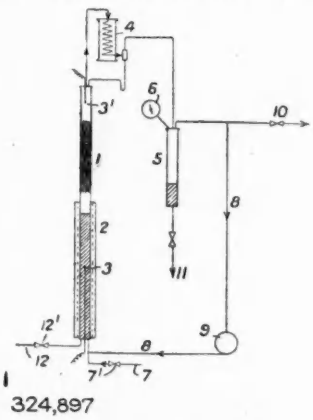
tained by a wet vacuum pump which withdraws uncondensed gases and liquid condensate or an auxiliary liquid. Vapour from a still 1 passes through a condenser 6 and the condensate is cooled to a predetermined point in a cooler 10 and passed to a wet vacuum pump 12 in which the condensate acts as a sealing liquid. Gases are separated in a chamber 14, and liquid collects in a tank 16. Alternatively, the condensate from a cooler 28 may pass to a separator 30 and reservoir 32 under vacuum. The pump 36 employs an auxiliary sealing liquid from a reservoir 41 which mixes with uncondensed gases from pipe 35. The liquid used is a solvent for the distilled substance and has a low vapour pressure. If the distilled substance is corrosive, the sealing liquid may neutralise any traces carried over by the gases. The liquid is recovered in a separator 38.

324,916. Lixiviating. J. Y. Johnson, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, November 5, 1928.

Material such as caliche, carnallite, crude alkali or alkaline earth sulphide melts, are lixiviated by passing in water heated above 100° C. from above and releasing the pressure, or the salt may be heated above 100° C. and sprayed with water or mother liquor. Solution retained in the salt is extracted by compressed air, and the process may be made continuous by employing a series of containers through which the liquid is passed in succession with periodical emptying and recharging. The solution is concentrated by steam, which is returned to the lixiviating vessel, and the solution is crystallised and the mother liquor returned to the concentrator. Examples describe the production of sodium nitrate and then sodium chloride from caliche, magnesium chloride and potassium chloride from carnallite, and sodium and barium sulphide from their melts.

324,897. Secondary and Tertiary Alcohols and Ethylene. A. Carpmael, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, November 1, 1928.

Higher homologues of ethylene are treated with dilute acid or an aqueous salt solution of an acid reaction, in the presence of one or more compounds of bismuth or a heavy metal of



the first group at a temperature of 100°–250° C. and at a partial pressure of the higher homologue of ethylene not substantially less than 10 atmospheres. The gas employed may be industrial gas containing propylene, butylene and amylene, which may be concentrated by partial liquefaction, the dilute acids employed may be hydrochloric, sulphuric, phosphoric, *p*-toluene-sulphonic, or naphthalene-di-sulphonic acid. The catalyst may be bismuth chloride or oxy-chloride, cuprous chloride, copper sulphate, phosphate, *p*-toluene-sulphonate, or naphthalene-disulphonate, silver sulphate or naphthalene di-sulphonate. The gases may be forced into an acid-proof autoclave containing the dilute acid and catalyst, and after cooling and reduction of pressure, the resulting isopropyl and isobutyl alcohols are recovered by distillation in the form of their azeotropic mixtures with water. Alternatively, the acid and catalyst flow in counter current to the gases, and the liquid containing the alcohols is drawn off. In an example, propylene is drawn through pipes 7 and valve 7^1 into a silver-lined steel tube 1 containing dilute sulphuric acid in its lower part, which is heated electrically to 220° C. Water is supplied through a pipe 12 and valve 12^1. The resulting mixture of isopropyl alcohol and water vapour is rectified in the upper part of the tube 1 which is packed with Raschig rings, and the vapour passes to a reflex condenser 4 at such a temperature that vapour rich in propyl alcohol passes to a condenser 5. The excess of propylene passes through pipe 8 and pump 9 back to the chamber 1. Some silver sulphate may be added to the chamber 1 if necessary

324,966. DYES. A. Carpmael, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, October 10, 1928.

Aromatic aldehydes containing a sulphonic acid group in the ortho position are condensed with primary aromatic amines containing no sulphonic group, to obtain triaryl methane dyes fast to alkalies and light. Thus benzaldehyde 2 : 4-disulphonic acid and *m*-xylidine are condensed, and the oxidised leuco compound dyes wool bluish-violet from an acid bath. The corresponding compound from benzaldehyde-*o*-sulphonic acid and *o*-toluidine gives violet shades on silk. Other components which may be employed are benzaldehyde-2 : 5- and 2 : 6-disulphonic acids, and 5-chlor-benzaldehyde-2 : 4-disulphonic acid.

324,977. COLLOID MILLS. H. E. Potts, Liverpool. From H. Plauson, 51, Hagedornstrasse, Hamburg. Application date, November 8, 1928.

Material to be disintegrated for the production of colloids is

324,977

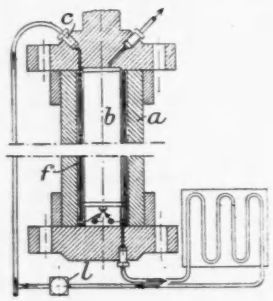
passed through a ring of inter-engaging cogs 9, 10, 11, 12, and is then thrown against a stationary or rotating toothed surface 8, or a second ring of cogs, or a screen of parallel vanes.

325,017. ALUMINA AND POTASSIUM SULPHATE. G. S. Tilley, Box 411, Mill Valley, Cal., U.S.A., M.E. Dam and E. S. Dam, Securities Building, Seattle, Cal., U.S.A. Application date, November 13, 1928.

Crystallised potash alum is heated to 80°–85° C. without melting the crystals, till over one-half of the water of crystallisation is removed. The temperature is then increased to 800°–1,000° C. to expel the sulphur trioxide from the aluminium sulphate, and the trioxide is then absorbed in strong sulphuric acid. The potassium sulphate and alumina are separated by leaching.

325,028. CATALYTIC APPARATUS. H. Harter, 8, Theresienstrasse, Würzburg, Germany. Application date, November 24, 1928.

Exothermic gas reactions are conducted in a cylinder *b* surrounded by a heat-insulating cylinder *f* and a pressure-



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resisting cylinder *a*. The reaction gas first flows through the outer annular space between the cylinders *a*, *f*, and then through the reaction cylinder, and a pump *l* circulates an independent cooling medium through the space between the cylinders *f*, *b*. The cooling medium may be similar to the reaction gas.

325,105. ACETALDEHYDE FROM ETHYL ALCOHOL. J. W. Woolcock, Norton Hall, The Green, Norton-on-Tees, Durham, and Imperial Chemical Industries, Ltd., Millbank, London. Application date, February 15, 1929.

A mixture of alcohol vapour with 35–75 per cent. of the theoretical amount of an oxygen-containing gas required to oxidise the alcohol to acetaldehyde, is passed over a dehydrogenating catalyst above 450° C. Thus, a mixture of alcohol vapour 1 part by volume and air 1·1 parts by volume, is passed over silver gauze discs in a copper tube heated to 510° C. The hot gases may be used to preheat the fresh gases. Acetaldehyde is obtained.

325,115. ESTERS. G. B. Ellis, London. From Soc. des Usines Chimiques Rhone-Poulenc, 21, Rue Jean-Goujon, Paris. Application date, February 19, 1929.

Vinyl esters are treated at a low temperature with a slight excess of halogen. The excess may be removed by passing an inert gas through the mixture, or by adding more vinyl ester and allowing to stand. Diluents such as carbon tetrachloride or benzene may be present. In an example, dry vinyl acetate is treated in a lead apparatus at 0° C. with chlorine, the excess of which is afterwards removed by a stream of air, or by adding vinyl acetate and allowing to stand. Dichlorethyl acetate is obtained. Other examples describe the production of dibromethyl acetate, dichlorethyl monochloracetate, and dibromethyl butyrate.

325,151. SYNTHETIC DRUGS. Boots Pure Drug Co., Ltd., and F. L. Pyman, Station Street, Nottingham. Application date, March 22, 1929.

Equimolecular proportions of αδ-diamino-β-ketobutane and sodium thiocyanate are condensed to obtain 2-thiol-4 (5)-β-aminoethyl-glyoxaline. This may be oxidised with ferric chloride to obtain 4 (5)-β-aminoethyl-glyoxaline (histamine). The starting material, α δ-diamino-β-ketobutane may be obtained by hydrolysing α δ-dibenzoylamino-β-keto-butane with aqueous alcoholic hydrochloric acid under pressure.

325,152. ETHYLENE FROM ACETYLENE, PRODUCTION OF. J. Y. Johnson, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, March 23, 1929.

Poisoning of catalysts consisting of nickel, cobalt, copper, chromium or palladium, with or without oxides or silicates employed in the catalytic hydrogenation of acetylene is prevented by adding 5 to 20 per cent. of water vapour to the reaction mixture, so as to prevent the formation of polymerised bodies. For this purpose, the gas may be passed over water heated to 95° to 96° C. A palladium catalyst is obtained by adding palladious chloride to a suspension of kieselguhr in water and reducing with hydrogen. The product is filtered, dried, mixed with water-glass, and applied to granular pumice. A nickel catalyst is obtained by precipitating water-glass with calcium nitrate, mixing the precipitate with nickel oxide, depositing on pumice, and reducing with hydrogen.

NOTE.—Abstracts of the following specifications, which are now accepted, appeared in THE CHEMICAL AGE when they became open to inspection under the International Convention: 297,061 (C. Still), relating to purification of gases containing hydrogen sulphide, see Vol. XIX, p. 497; 301,832 (Minerals Separation, Ltd.), relating to froth-flotation concentration of ores, see Vol. XX, p. 23 (Metallurgical Section); 302,178 (I.G. Farbenindustrie Akt.-Ges.), relating to chromium oxide, see Vol. XX, p. 159; 302,928 (I.G. Farbenindustrie Akt.-Ges.), relating to acid wool dyestuffs, see Vol. XX, p. 189; 303,021 (Graesser Monsanto Chemical Works, Ltd.), relating to separation of alkoxy-isoeugenol from alkoxy-isochairbetol and production of isoeugenol from the separated compounds, see Vol. XX, p. 214; 304,739 (I.G. Farbenindustrie Akt.-Ges.), relating to dyeing esters or ethers of cellulose or its transformation products, see Vol. XX, p. 320; 308,651 (I.G. Farbenindustrie Akt.-Ges.), relating to dyestuffs, see Vol. XX, p. 524; 312,667 (A. Folliett and N. Sainderichin), relating to treatment of ores, see Vol. XXI, p. 23 (Metallurgical Section).

Specifications Accepted with Date of Application

298,559. Fatty sulphonic acids, Preparation of, and wetting, cleaning and emulsifying agents therefrom. H. T. Bohme Akt.-Ges. October 11, 1927. Addition to 261,385.

299,326. Acyl cellulose, Process for improving. I.G. Farbenindustrie Akt.-Ges. October 22, 1927.

301,311. Halogen-naphthalene ketones, Manufacture of. I.G. Farbenindustrie Akt.-Ges. November 26, 1927.

302,692. Aluminium-silicon alloys, Manufacture of. Soc. d'Electrochimie d'Electrometallurgie et des Aciéries Electriques d'Ugine. December 20, 1927.

302,912. Catalytic hydrogenation. Ges. für Teerverwertung, and H. Kaffer. December 23, 1927.

302,924. Zinc salt solutions, Production of. Metallges. Akt.-Ges. Application date, December 23, 1927.

303,115. Alkaline earth cyanides, Manufacture of. I.G. Farbenindustrie Akt.-Ges. December 28, 1927.
303,513. Magnetic separation of materials. F. Krupp Grusonwerk Akt.-Ges. January 5, 1928.
305,202. Vanadium-aluminium-silicon alloys, Manufacture of. Vanadium Corporation of America. February 2, 1928.
305,593. Ortho-(amino-aroyl)-benzoic acids and inner anhydrides thereof, Manufacture of. I.G. Farbenindustrie Akt.-Ges. February 7, 1928.
305,999. Welding metals and alloys. I.G. Farbenindustrie Akt.-Ges. February 13, 1928.
306,558 and 306,842. 2-mercapto-arylene-thiazole compounds, Manufacture of. I.G. Farbenindustrie Akt.-Ges. February 23 and 24, 1928.
307,343. Pure benzoic acid, Manufacture of. I.G. Farbenindustrie Akt.-Ges. March 5, 1928.
307,903 and 309,116. Ammonia and hydrogen sulphide from coal distillation and like gases, Removal of. C. J. Hansen. March 17, 1928, and April 5, 1928.
309,163. Perylene tetracarboxylic anhydride, Process for manufacturing. F. Bensa. April 6, 1928.
309,586. Aluminium alloys. O. Reuleaux. April 13, 1928.
311,735. Vulcanising rubber. I.G. Farbenindustrie Akt.-Ges. May 15, 1928.
316,542. Purifying natural heavy spar. Sachtleben Akt.-Ges. für Bergbau und Chemische Industrie. July 30, 1928.
317,001. Treating ores, metallurgical products, or the like. Metallges. Akt.-Ges. August 8, 1928.
317,462. Separation of anhydrous acetic acid from its aqueous Solutions. Soc. Anon. des Distilleries des Deux-Sèvres. August 17, 1928.
326,762. Ar-tetra-hydronaphthols and their esters and ethers, Manufacture of. A. Carpmael. (*I.G. Farbenindustrie Akt.-Ges.*) November 16, 1928.
326,789. Therapeutical media, Manufacture of. A. Carpmael. (*I.G. Farbenindustrie Akt.-Ges.*) November 13, 1928.
326,791. Dis- and poly-azo dyestuffs, Manufacture of. A. Carpmael. (*I.G. Farbenindustrie Akt.-Ges.*) November 17, 1928.
326,795. Condensation products containing nitrogen and sulphur, Manufacture of. J. Y. Johnson. (*I.G. Farbenindustrie Akt.-Ges.*) December 17, 1928.
326,803. Insecticides. A. Carpmael. (*I.G. Farbenindustrie Akt.-Ges.*) December 19, 1928.
326,812. Butyl alcohol, Manufacture of. E. Neumann. September 18, 1928.
326,814. Manures, Manufacture of. H. W. Hereward and P. O. Hereward. (*H. Wigglesworth, U. Orlandi, and G. Levi.*) November 14, 1928.
326,815. Sulphonic acids derived from non-aromatic carboxylic acids, Manufacture of. J. Y. Johnson. (*I.G. Farbenindustrie Akt.-Ges.*) Dec. 12, 1928.
326,818. Improving lead, Process for. O. Y. Imray. (*I.G. Farbenindustrie Akt.-Ges.*) December 18, 1928.
326,820. Casting magnesium or magnesium alloys, Method of. I.G. Farbenindustrie Akt.-Ges. and A. L. Mond. December 19, 1928. Addition to 187,943 and 219,753.
326,865. Mixed ethers of carbohydrates, Manufacture of. A. Carpmael. (*I.G. Farbenindustrie Akt.-Ges.*) December 19, 1928.
326,866. Dyeing with aid of diazo compounds. O. Y. Imray. (*I.G. Farbenindustrie Akt.-Ges.*) December 19, 1928.
326,869. Synthetic rubber, Manufacture of. A. Carpmael. (*I.G. Farbenindustrie Akt.-Ges.*) December 20, 1928.
326,874. Anthanthrone derivatives, Manufacture of. J. Y. Johnson. (*I.G. Farbenindustrie Akt.-Ges.*) December 22, 1928.
326,884. Synthetic resins, Manufacture of. H. Wade. (*Bakelite Corporation.*) December 24, 1928.
326,896. Destructive hydrogenation, Apparatus and method for. W. R. Tate, H. P. Stephenson, and Imperial Chemical Industries, Ltd. December 31, 1928.
326,949. Dyestuffs of the anthraquinone series, Preparation of. Imperial Chemical Industries, Ltd., F. Lodge, and W. W. Tatum. February 8, 1929.
326,977. Separation of mixtures of sulphuric acid and nitric acids. J. Y. Johnson. (*I.G. Farbenindustrie Akt.-Ges.*) February 28, 1929.
327,007. Dyestuffs, Manufacture of. J. Y. Johnson. (*I.G. Farbenindustrie Akt.-Ges.*) March 25, 1929.
327,025. Endothermic catalytic reactions, Apparatus for carrying out. J. Y. Johnson. (*I.G. Farbenindustrie Akt.-Ges.*) April 15, 1929.
327,026. Urea, Manufacture of. J. Y. Johnson. (*I.G. Farbenindustrie Akt.-Ges.*) April 15, 1929.
327,047. Potassium nitrate, Manufacture of. Kali-Forschungs-Anstalt Ges. February 11, 1929.
327,087. Vat-dyestuffs preparations, Manufacture of. J. Y. Johnson. (*I.G. Farbenindustrie Akt.-Ges.*) March 25, 1929.
326,971. Derivatives of 2:3-hydroxynaphthoic acid, Manufacture of. O. Y. Imray. (*I.G. Farbenindustrie Akt.-Ges.*) February 26, 1929.

Applications for Patents

[In the case of applications for patents under the International Convention, the priority date (that is, the original application date abroad which the applicant desires shall be accorded to the patent) is given in brackets, with the name of the country of origin. Specifications of such applications are open to inspection at the Patent Office on the anniversary of the date given in brackets, whether or not they have been accepted.]

Caress, A., and Imperial Chemical Industries, Ltd. Production of sulphur. 10,893. April 5.
Carpmael, A., and I.G. Farbenindustrie Akt.-Ges. Manufacture of complex salts. 10,388. April 1.
Ellis, G. B., and Soc. des Usines Chimiques Rhône Poulenc. Manufacture of organic acyl halogenides. 10,621. April 3. (March 1, 1929.)
Fairweather, D. A. W., Imperial Chemical Industries, Ltd., and Thomas, J. Production and use of azo dyes. 10,561. April 3.
Groves, W. W., and I.G. Farbenindustrie Akt.-Ges. Manufacture of azo-dyestuff. 10,478. April 2.
—— Manufacture of yellow mono azo-dyestuffs. 10,479. April 2.
—— Manufacture of azo-dyestuffs insoluble in water. 10,585. April 3.
Hall, A. J. Dyeing cellulose acetate fibres, films, etc., with aniline black. 10,415. April 2.
Hene, E. Production of pure alkali fluorides. 10,806. April 4.
I.G. Farbenindustrie Akt.-Ges., and Johnson, J. Y. Manufacture of condensation products. 10,189. March 31.
—— Apparatus for reduction of iron ores, etc. 10,190. March 31.
—— Manufacture of pure metals. 10,191. March 31.
I.G. Farbenindustrie Akt.-Ges., and Mond, A. L. Welding magnesium, etc. 10,254. March 31.
—— Manufacture of complex salts. 10,388. April 1.
—— Apparatus for measuring intensity of ultraviolet rays. 10,577. April 3.
—— Manufacture of condensation products of the anthraquinone series. 10,578. April 3.
—— Apparatus for heat treatment of liquid or granular, etc., materials. 10,759. April 4.
—— Recovery of micro-organisms for unhairing purposes. 10,760. April 4.
—— Production of acetals. 10,761. April 4.
—— Production of alkyl-aralkyl, etc., esters. 10,765. April 4.
—— Production of zinc oxide, etc. 10,885. April 5.
—— Esterification of fatty acids, etc. 10,886. April 5.
I.G. Farbenindustrie Akt.-Ges. Manufacture of soluble leuco-preparations of vat-dyestuffs. 10,193. March 31. (Germany, March 30, 1929.)
—— Manufacture of nitrogen-containing derivatives of benzanthrone series. 10,361. April 1. (March 13, 1929.)
—— Insulators for sparking-plugs. 10,583. April 3. (Germany, April 22, 1929.)
—— Manufacture of soluble cellulose esters. 10,782. April 4. (Germany, April 4, 1929.)
Imperial Chemical Industries, Ltd. Production of fertilisers. 10,157. March 31.
Imperial Chemical Industries, Ltd. Jones, D. C. R., Smith, W., Thomas, J., Thomson, R. F., and Primrose, J. Benzanthrone colouring-matters, etc. 10,386, 10,387. April 1.
—— Application of flexible coatings to rubber, etc. 10,457. April 2.
Imperial Chemical Industries, Ltd., and Moss, H. W. Dyeing esters and ethers of cellulose. 10,560. April 3.
—— Production of hydrogen, etc. 10,881. April 5.
—— Process for producing sulphur. 10,882, 10,883, 10,884. April 5.
Imperial Chemical Industries, Ltd., and Du Pont de Nemours and Co. Manufacture of resinous compositions, etc. 10,748. April 4.
Imperial Chemical Industries, Ltd., and Grasselli Chemical Co. Manufacture of materials in granular form. 10,749. April 4.
—— Processes for pickling metals, etc. 10,750, 10,751. April 4.
Kali-Forschungs-Anstalt Ges. Production of potassium nitrate. 10,315. April 1. (Germany, April 19, 1929.)
Lacell, E. Dehydration of magnesium chloride. 10,913. April 5. (Germany, April 5, 1929.)
Lenander, N. E. Recovering sulphur from sulphide minerals. 10,897. April 5.
Mercurio, M. Purifying hydrocarbons. 10,503. April 2. (France, October 30, 1929.)
—— Transforming heavy hydrocarbons into a light purified fuel. 10,504. April 2. (France, June 22, 1929.)
Mond, A. L. (Vereinigte Stahlwerke Akt.-Ges.). Granulation of liquid slag. 10,584. April 3.
Naugatuck Chemical Co. Treatment of aldehyde-amines. 10,379. April 1. (United States, April 17, 1929.)
—— Making styrols. 10,382. April 1. (United States, April 20, 1929.)
Putt, E. B. Manufacture of phenolphthalein composition. 10,754. April 4.
Scottish Dyes, Ltd., Service, D., and Thomas, J. Art of colouring. 10,226. March 31.
Selden Co. Production of dibenzanthrone. 10,821. April 4. (United States, April 4, 1929.)
Silver Springs Bleaching and Dyeing Co., Ltd. Dyeing cellulose acetate fibres, films, etc., with aniline black. 10,415. April 2.

Weekly Prices of British Chemical Products

The prices and comments given below respecting British chemical products are based on direct information supplied by the British manufacturers concerned. Unless otherwise qualified, the figures quoted apply to fair quantities, net and naked at makers' works.

General Heavy Chemicals

ACID ACETIC, 40% TECH.—£19 per ton.

ACID, CHROMIC.—1s. 0⅝d. per lb. d/d U.K.

ACID HYDROCHLORIC.—Spot, 3s. 9d. to 6s. per carboy d/d, according to purity, strength and locality.

ACID NITRIC, 80° Tw.—Spot £20 to £25 per ton, makers' works according to district and quality.

ACID SULPHURIC.—Average National prices f.o.r. makers' works, with slight variations up and down owing to local considerations; 140° Tw., Crude Acid, 60s. per ton. 168° Tw., Arsenical, £5 10s. per ton. 168° Tw., Non-arsenical, £6 15s. per ton.

AMMONIA (ANHYDROUS).—Spot, 10d. per lb., d/d in cylinders.

AMMONIUM BICHROMATE.—8½d. per lb. d/d U.K.

BISULPHITE OF LIME.—£7 10s. per ton, f.o.r. London, packages free.

BLEACHING POWDER, 35%.—Spot, £7 10s. per ton d/d station in casks, special terms for contracts.

BORAX, COMMERCIAL.—Crystals, £19 10s. to £20 per ton; granulated, £12 10s. per ton; powder, £14 per ton. (Packed in 1 cwt. bags carriage paid any station in Great Britain. Prices quoted are for one ton lots and upwards.

CALCIUM CHLORIDE (SOLID).—Spot, £4 15s. to £5 5s. per ton d/d in drums.

CHROMIUM OXIDE.—9¾d. and 10¼d. per lb. according to quantity d/d U.K.

CHROMETAN.—Crystals, 3⅜d. per lb. Liquor, £18 15s. per ton d/d U.K.

COPPER SULPHATE.—£25 to £25 10s. per ton.

METHYLATED SPIRIT 61 O.P.—Industrial, 1s. 3d. to 1s. 8d. per gall. pyridinised industrial, 1s. 5d. to 1s. 10d. per gall.; mineralised 2s. 4d. to 2s. 8d. per gall.; 64 O.P., 1d. extra in all cases.

NICKEL SULPHATE.—£38 per ton d/d.

NICKEL AMMONIA SULPHATE.—£38 per ton d/d.

POTASH CAUSTIC.—£30 to £33 per ton.

POTASSIUM BICHROMATE CRYSTALS AND GRANULAR.—4⅜d. per lb. nett d/d U.K. spot; ground ½d. per lb. extra.

POTASSIUM CHLORATE.—3¾d. per lb., ex-wharf, London, in cwt. kegs.

POTASSIUM CHROMATE.—8¼d. per lb. d/d U.K.

SALAMMONIAC.—Firsts lump, spot, £42 10s. per ton d/d station in barrels. Chloride of ammonia, £37 to £45 per ton, carr. paid.

SALT CAKE, UNGROUND.—Spot, £3 7s. 6d. per ton d/d station in bulk.

SODA ASH, 58° E.—Spot, £6 per ton, f.o.r. in bags, special terms for contracts.

SODA CAUSTIC, SOLID, 76/77%.—Spot, £14 10s. per ton, d/d station.

SODA CRYSTALS.—Spot, £5 to £5 5s. per ton, d/d station or ex depot in 2 cwt. bags.

SODIUM ACETATE 97/98%.—£21 per ton.

SODIUM BICARBONATE, REFINED.—Spot, £10 10s. per ton d/d station in bags.

SODIUM BICHROMATE CRYSTALS.—3⅝d. per lb. nett d/d U.K. spot. Anhydrous ¾d. per lb. extra.

SODIUM BISULPHITE POWDER, 60/62%.—£17 10s. per ton delivered for home market, 1-cwt. drums included; £15 10s. f.o.r. London.

SODIUM CHLORATE.—2¾d. per lb.

SODIUM CHROMATE.—3½d. per lb. d/d U.K.

SODIUM NITRITE.—Spot, £19 per ton, d/d station in drums.

SODIUM PHOSPHATE.—£14 per ton, f.o.b. London, casks free.

SODIUM SILICATE, 140° Tw.—Spot, £8 5s. per ton, d/d station returnable drums.

SODIUM SULPHATE (GLAUBER SALTS).—Spot, £4 2s. 6d. per ton, d/d address in bags.

SODIUM SULPHIDE CONC. SOLID.—Spot, £10 5s. per ton d/d in drums. Crystals—Spot, £7 10s. per ton d/d in sellers' casks.

SODIUM SULPHITE, PEA CRYSTALS.—Spot, £13 10s. per ton, d/d station in kegs. Commercial—Spot, £9 per ton, d/d station.

Coal Tar Products

ACID CARBOLIC CRYSTALS.—7d. to 7½d. per lb. Crude 60's, 2s. 4½d. to 2s. 5d. Jan.-June, 2s. 4d. July-Dec. per gall.

ACID CRESYLIC 99/100.—2s. 2d. to 2s. 6d. per gall. Pure, 5s. 6d. per gall. 97/99.—2s. 1d. to 2s. 2d. per gall. Pale, 95%, 1s. 9d. to 1s. 10d. per gall. 98%, 2s. to 2s. 2d. Dark, 1s. 6d. to 1s. 10d. Refined, 2s. 7d. to 2s. 10d. per gall.

ANTHRACENE.—A quality, 2d. to 2½d. per unit. 40%, £4 10s. per ton.

ANTHRACENE OIL, STRAINED, 1080/1090.—4¾d. to 5¼d. per gall. 1100, 5¼d. to 6d. per gall.; 1110, 6d. to 6½d. per gall. Unstrained (Prices only nominal).

BENZOLE.—Prices at works: Crude, 10d. to 11d. per gall.; Standard Motor, 1s. 5d. to 1s. 6d. per gall.; 90%, 1s. 7d. to 1s. 8d. per gall.; Pure, 1s. 10d. to 1s. 11d. per gall.

TOLUOLE.—90%, 1s. 9d. to 2s. 1d. per gall. Firm. Pure, 1s. 11d. to 2s. 5d. per gall.

XYLOL.—1s. 5d. to 1s. 10d. per gall. Pure, 1s. 8d. to 2s. 1d. per gall.

CREOSOTE.—Cresylic, 20/24%, 6¾d. to 7d. per gall.; Heavy, for Export, 6¼d. to 6⅝d. per gall. Home, 4d. per gall. d/d. Middle oil, 4¼d. to 5d. per gall. Standard specification, 3d. to 4d. per gall. Light gravity, 1¼d. to 1⅝d. per gall. ex works. Salty, 7½d. per gall.

NAPHTHA.—Crude, 8½d. to 8¾d. per gall. Solvent, 90/160, 1s. 3d. to 1s. 3½d. per gall. Solvent, 95/160, 1s. 4d. to 1s. 6d. per gall. Solvent 90/190, 1s. to 1s. 2½d. per gall.

NAPHTHALENE, CRUDE.—Drained Creosote Salts, £4 10s. to £5 per ton. Whizzed, £4 10s. per ton. Hot pressed, £8 per ton.

NAPHTHALENE.—Crystals, £12 5s. per ton. Purified Crystals, £14 10s. per ton. Flaked, £14 to £15 per ton, according to districts.

PITCH.—Medium soft, 46s. to 47s. 6d. per ton, f.o.b., according to district. Nominal.

PYRIDINE.—90/140, 3s. 9d. to 4s. per gall. 90/160, 3s. 6d. to 3s. 9d. per gall. 90/180, 1s. 9d. to 2s. 3d. per gall. Heavy prices only nominal.

Intermediates and Dyes

In the following list of Intermediates delivered prices include packages except where otherwise stated:

ACID AMIDONAPHTHOL DISULPHO (1-8-2-4).—10s. 9d. per lb.

ACID ANTHRANILIC.—6s. per lb. 100%.

ACID BENZOIC.—1s. 8½d. per lb.

ACID GAMMA.—3s. 9d. per lb. 100% d/d buyer's works.

ACID H.—2s. 3d. per lb. 100% d/d buyer's works.

ACID NAPHTHIONIC.—1s. 6d. per lb. 100% d/d buyer's works.

ACID NEVILLE AND WINTHER.—2s. 7d. per lb. 100% d/d buyer's works.

ACID SULPHANILIC.—8½d. per lb. 100% d/d buyer's works.

ANILINE OIL.—8½d. per lb., drums extra, d/d buyer's works.

ANILINE SALTS.—8½d. per lb. d/d buyer's works.

BENZALDEHYDE.—1s. 8d. per lb., packages extra, d/d buyer's works.

BENZIDINE BASE.—2s. 4d. per lb. 100% d/d buyer's works.

BENZOIC ACID.—1s. 8½d. per lb. d/d buyer's works.

o-CRESOL 29/31° C.—£3 1s. 10d. per cwt., in 1 ton lots.

m-CRESOL 98/100%.—2s. 9d. per lb., in ton lots d/d.

p-CRESOL 32/34° C.—2s. per lb., in ton lots d/d.

DICHLORANILINE.—1s. 10d. per lb.

DIMETHYLANILINE.—1s. 9½d. per lb., drums extra d/d buyer's works.

DINITROBENZENE.—8d. per lb.

DINITROCHLORBENZENE.—£74 per ton d/d.

DINITROTOLUENE.—48/50° C., 7½d. per lb.; 66/68° C., 9d. per lb.

DIPHENYLAMINE.—1s. 8d. per lb. d/d buyer's works.

a-NAPHTHOL.—1s. 11d. per lb. d/d buyer's works.

B-NAPHTHOL.—£65 per ton in 1 ton lots, d/d buyer's works.

a-NAPHTHYLAMINE.—1s. per lb. d/d buyer's works.

B-NAPHTHYLAMINE.—2s. 9d. per lb. d/d buyer's works.

o-NITRANILINE.—5s. 11d. per lb.

m-NITRANILINE.—2s. 6d. per lb. d/d buyer's works.

p-NITRANILINE.—1s. 8d. per lb. d/d buyer's works.

NITROBENZENE.—6½d. per lb, 5-cwt. lots, drums extra, d/d buyer's works.

NITRONAPHTHALENE.—9d. per lb.

R. SALT.—2s. per lb. 100% d/d buyer's works.

SODIUM NAPHTHIONATE.—1s. 6½d. per lb. 100% d/d buyer's works.

o-TOLUIDINE.—8d. per lb., drums extra, d/d buyer's works.

p-TOLUIDINE.—1s. 9d. per lb. d/d buyer's works.

m-XYLIDINE ACETATE.—3s. 1d. per lb. 100%.

N. W. ACID.—4s. 9d. per lb. 100%.

Wood Distillation Products

ACETATE OF LIME.—Brown, £9 15s. to £10 5s. per ton. Grey, £16 10s. to £17 10s. per ton. Liquor, 9d. per gall.

ACETONE.—£78 per ton.

CHARCOAL.—£6 to £8 10s. per ton, according to grade and locality.

IRON LIQUOR.—1s. 3d. per gall. 32° Tw. 1s. per gall. 24° Tw.

WOOD CREOSOTE.—1s. 9d. per gall., unrefined.

WOOD NAPHTHA, MISCIBLE.—3s. 8d. to 3s. 11d per gall. Solvent, 4s. to 4s. 3d. per gall.

WOOD TAR.—£3 10s. to £4 10s. per ton

BROWN SUGAR OF LEAD.—£38 per ton.

Rubber Chemicals

ANTIMONY SULPHIDE.—Golden, 6½d. to 1s. 3d. per lb. according to quality; Crimson, 1s. 3d. to 1s. 5d. per lb., according to quality.

ARSENIC SULPHIDE, YELLOW.—1s. 8d. to 1s. 10d. per lb.

BARYTES.—£5 10s. to £7 per ton, according to quality.

CADMIUM SULPHIDE.—5s. to 6s. per lb.

CARBON BISULPHIDE.—£25 to £27 10s. per ton, according to quantity.

CARBON BLACK.—4 1/16d. to 4½d. per lb., ex wharf.

CARBON TETRACHLORIDE.—£40 to £50 per ton, according to quantity, drums extra.

CHROMIUM OXIDE, GREEN.—1s. 2d. per lb.

DIPHENYLGUANIDINE.—3s. 6d. per lb.

LITHOPONE, 30%.—£20 to £22 per ton.

SULPHUR.—£9 10s. to £13 per ton, according to quality.

SULPHUR CHLORIDE.—4d. to 7d. per lb., carboys extra.

SULPHUR PRECIP. B.P.—£55 to £60 per ton.

ZINC SULPHIDE.—8d. to 11d. per lb.

Pharmaceutical and Photographic Chemicals

ACID, ACETIC, PURE, 80%.—£37 per ton, ex wharf London, barrels free.

ACID, ACETYL SALICYLIC.—2s. 9d. to 2s. 11d. per lb., according to quantity.

ACID, BENZOIC B.P.—2s. to 3s. 3d. per lb., according to quantity. Solely ex Gum, 1s. 3d. to 1s. 4d. per oz.; 50-oz. lots, 1s. 3d. per oz.

ACID, BORIC B.P.—Crystal, £32 per ton; powder, £36 per ton; For one ton lots and upwards. Packed in 1-cwt. bags carriage paid any station in Great Britain.

ACID, CAMPHORIC.—19s. to 21s. per lb.

ACID, CITRIC.—1s. 8½d. per lb., less 5%.

ACID, GALLIC.—2s. 8d. per lb. for pure crystal, in cwt. lots.

ACID, MOLYBDIC.—5s. 3d. per lb. in ¼ cwt. lots. Packages extra. Special prices for quantities and contracts.

ACID, PYROGALLIC, CRYSTALS.—7s. 3d. per lb. Resublimed, 8s. 3d.

ACID, SALICYLIC, B.P. PULV.—1s. 5d. to 1s. 7d. per lb. Technical.—1s. to 1s. 2d. per lb.

ACID, TANNIC B.P.—2s. 8d. to 2s. 10d. per lb.

ACID, TARTARIC.—1s. 3d. per lb., less 5%.

ACETANILIDE.—1s. 5d. to 1s. 8d. per lb. for quantities.

AMIDOL.—7s. 6d. to 9s. per lb., d/d.

AMIDOPYRIN.—7s. 9d. to 8s. per lb.

AMMONIUM BENZOATE.—3s. 3d. to 3s. 9d. per lb., according to quantity. 18s. per lb. ex Gum.

AMMONIUM CARBONATE B.P.—£36 per ton. Powder, £39 per ton in 5 cwt. casks. Resublimated, 1s. per lb.

AMMONIUM MOLYBDATE.—4s. 9d. per lb. in ¼ cwt. lots. Packages extra. Special prices for quantities and contracts.

ATROPHINE SULPHATE.—9s. per oz.

BARBITONE.—5s. 9d. to 6s. per lb.

BENZONAPHTHOL.—3s. to 3s. 3d. per lb .spot.

BISMUTH CARBONATE.—7s. 6d. per lb.

BISMUTH CITRATE.—7s. 6d. per lb.

BISMUTH SALICYLATE.—7s. 3d. per lb.

BISMUTH SUBNITRATE.—6s. 6d. per lb.

BISMUTH NITRATE.—Cryst. 5s. per lb.

BISMUTH OXIDE.—9s. 6d. per lb.

BISMUTH SUBCHLORIDE.—9s. 9d. per lb.

BISMUTH SUBGALLATE.—7s. 3d. per lb. Extra and reduced prices for smaller and larger quantities of all bismuth salts respectively.

BISMUTHI ET AMMON LIQUOR.—Cit. B.P. in W. Qts. 11½d. per lb.; 12 W. Qts. 10d. per lb.; 36 W. Qts. 9d. per lb.

BORAX B.P.—Crystal, £21 per ton; powder, £22 per ton; For one ton lots and upwards. Packed in 1-cwt. bags carriage paid any station in Great Britain.

BROMIDES.—Ammonium, 2s. 0d. per lb.; potassium, 1s. 8d. per lb.; granular, 1s. 5½d. to 1s. 7¾d. per lb.; sodium, 1s. 11d. per lb. Prices for 1 cwt. lots.

CALCIUM LACTATE.—B.P., 1s. 1½d. to 1s. 3d. per lb., in 1-cwt. lots.

CAMPHOR.—Refined flowers, 3s. 3d. to 3s. 4d. per lb., according to quantity; also special contract prices.

CHLORAL HYDRATE.—3s. 1d. to 3s. 4d. per lb.

CHLOROFORM.—2s. 4½d. to 2s. 7½d. per lb., according to quantity.

CREOSOTE CARBONATE.—6s. per lb.

ETHERS.—S.G. ·730—11d. to 1s. per lb., according to quantity; other gravities at proportionate prices.

FORMALDEHYDE, 40%.—37s. per cwt., in barrels, ex wharf.

GUAIACOL CARBONATE.—4s. 6d. to 4s. 9d. per lb.

HEXAMINE.—2s. 3d. to 2s. 6d. per lb.

HOMATROPINE HYDROBROMIDE.—30s. per oz.

HYDRASTINE HYDROCHLORIDE.—English make offered at 120s. per oz.

HYDROGEN PEROXIDE (12 VOLS.).—1s. 4d. per gallon, f.o.r. makers' works, naked. Winchesters, 2s. 11d. per gall. B.P., 10 vols., 2s. to 2s. 3d. per gall.; 20 vols., 4s. per gall.

HYDROQUINONE.—3s. 9d. to 4s. per lb., in cwt. lots.

HYPOPHOSPHITES.—Calcium, 2s. 5d. per lb.; potassium, 2s. 8½d. per lb.; sodium, 2s. 7½d. per lb., in 1 cwt. lots, assorted.

IRON AMMONIUM CITRATE.—B.P., 2s. 8d. to 2s. 9d. per lb. Green, 2s. 10d. to 3s. per lb. U.S.P., 2s. 7d. to 2s. 10d. per lb.

IRON PERCHLORIDE.—18s. to 20s. per cwt., according to quantity.

IRON QUININE CITRATE.—B.P., 8¾d. to 9¼d. per oz., according to quantity.

MAGNESIUM CARBONATE.—Light commercial, £31 per ton net.

MAGNESIUM OXIDE.—Light commercial, £62 10s. per ton, less 2½%; Heavy commercial, £21 per ton, less 2½%; in quantity lower; Heavy Pure, 2s. to 2s. 3d. per lb.

MENTHOL.—A.B.R. recrystallised B.P., 15s. 9d. per lb. net; Synthetic, 9s. 6d. to 11s. 9d. per lb.; Synthetic detached crystals, 9s. 6d. to 11s. per lb., according to quantity; Liquid (95%), 9s. per lb.

MERCURIALS B.P.—Up to 1 cwt. lots, Red Oxide, crystals, 8s. 4d. to 8s. 5d. per lb., levig., 7s. 10d. to 7s. 11d. per lb.; Corrosive Sublimate, Lump, 6s. 7d. to 6s. 8d. per lb., Powder, 6s. to 6s. 1d. per lb.; White Precipitate, Lump, 6s. 9d. to 6s. 10d. per lb., Powder, 6s. 10d. to 6s. 11d. per lb., Extra Fine, 6s. 11d. to 7s. per lb.; Calomel, 7s. 2d. to 7s. 3d. per lb.; Yellow Oxide, 7s. 8d. to 7s. 9d. per lb.; Persulph, B.P.C., 6s. 11d. to 7s. per lb.; Sulph. nig., 6s. 8d. to 6s. 9d. per lb. Special prices for larger quantities.

METHYL SALICYLATE.—1s. 3d. to 1s. 5d. per lb.

METHYL SULPHONAL.—18s. 6d. to 20s. per lb.

METOL.—9s. to 11s. 6d. per lb. British make.

PARAFORMALDEHYDE.—1s 9d. per lb. for 100% powder.

PARALDEHYDE.—1s. 4d. per lb.

PHENACETIN.—3s. 8½d. to 4s. 1d. per lb.

PHENAZONE.—5s. 11d. to 6s. 1½d. per lb.

PHENOLPHTHALEIN.—5s. 11d. to 6s. 1½d. per lb.

POTASSIUM BITARTRATE 99/100% (Cream of Tartar).—99s. per cwt., less 2½ per cent.

POTASSIUM CITRATE.—B.P.C., 2s. 6d. per lb. in 28 lb. lots. Smaller quantities 1d. per lb. more.

POTASSIUM FERRICYANIDE.—1s. 9d. per lb., in cwt. lots.

POTASSIUM IODIDE.—16s. 8d. to 17s. 2d. per lb., according to quantity.

POTASSIUM METABISULPHITE.—6d. per lb., 1-cwt. kegs included f.o.r. London.

POTASSIUM PERMANGANATE.—B.P. crystals, 5½d per lb., spot.

QUININE SULPHATE.—1s. 8d. to 1s. 9d. per oz., bulk in 100 oz. tins

RESORCIN.—2s. 10d. to 3s. per lb., spot.

SACCHARIN.—43s. 6d. per lb.

SALOL.—2s. 3d. to 2s. 6d. per lb.

SODIUM BENZOATE B.P.—1s. 9d. per lb. for 1-cwt. lots.

SODIUM CITRATE, B.P.C., 1911, AND U.S.P. VIII.—2s. 2d. per lb., B.P.C. 1923, and U.S.P. IX—2s. 6d. per lb. Prices for 28 lb. lots. Smaller quantities 1d. per lb. more.

SODIUM FERROCYANIDE.—4d. per lb., carriage paid.

SODIUM HYPOSULPHITE, PHOTOGRAPHIC.—£15 per ton, d/d consignee's station in 1-cwt. kegs.

SODIUM NITROPRUSSIDE.—16s. per lb.

SODIUM POTASSIUM TARTRATE (ROCHELLE SALT).—100s. per cwt. Crystals, 5s. per cwt. extra.

SODIUM SALICYLATE.—Powder, 1s. 10d. to 2s. 2d. per lb. Crystal, 1s. 11d. to 2s. 1d. per lb.

SODIUM SULPHIDE, PURE RECRYSTALLISED.—10d. to 1s. 1d. per lb.

SODIUM SULPHIDE, ANHYDROUS.—£27 10s. to £29 10s. per ton, according to quantity. Delivered U.K.

SULPHONAL.—9s. 6d. to 10s. per lb.

TARTAR EMETIC, B.P.—Crystal or powder, 1s. 9d. to 1s. 10d. per lb.

THYMOL.—Puriss, 7s. 6d. to 8s. 6d. per lb., according to quantity. Firmer. Natural, 12s. per lb.

Perfumery Chemicals

ACETOPHENONE.—7s. per lb.

AUBEPINE (EX ANETHOL).—12s. per lb.

AMYL ACETATE.—2s. 6d. per lb.

AMYL BUTYRATE.—5s. per lb.

AMYL CINNAMIC ALDEHYDE.—12s. per lb.

AMYL SALICYLATE.—3s. per lb.

ANETHOL (M.P. 21/22° C.).—6s. 6d. per lb.

BENZALDEHYDE FREE FROM CHLORINE.—2s. 6d. per lb.

BENZYL ACETATE FROM CHLORINE-FREE BENZYL ALCOHOL.—2s. per lb.

BENZYL ALCOHOL FREE FROM CHLORINE.—2s. per lb.

BENZYL BENZOATE.—2s. 6d. per lb.

CINNAMIC ALDEHYDE NATURAL.—13s. 3d. per lb.

COUMARIN.—8s. 3d. per lb.

CITRONELLOL.—10s. per lb.

CITRAL.—8s. per lb.

ETHYL CINNAMATE.—6s. 6d. per lb.

ETHYL PHTHALATE.—2s. 9d. per lb.

EUGENOL.—9s. per lb.

GERANIOL (PALMAROSA).—20s. per lb.

GERANIOL.—7s. 6d. to 10s. per lb.

HELIOTROPINE.—6s. 6d. per lb.

ISO EUGENOL.—11s. 9d. per lb.

PHENYL ETHYL ACETATE.—11s. per lb.

PHENYL ETHYL ALCOHOL.—9s. 6d. per lb.

RHODINOL.—44s. per lb.

SAFROL.—2s. per lb.

TERPINEOL.—1s. 6d. per lb.

VANILLIN, EX CLOVE OIL.—13s. 6d. to 15s. per lb. Ex Guaiacol, 12s. 6d. to 13s. 9d. per lb.

Essential Oils

ALMOND OIL.—Foreign S.P.A., 10s. per lb.

ANISE OIL.—4s. 3d. per lb.

BERGAMOT OIL.—11s. 3d per lb.

BOURBON GERANIUM OIL.—18s. per lb.

CAMPHOR OIL, WHITE.—16os. per lb.

CASSIA OIL, 80/85%.—4s. 9d. per lb.

CINNAMON OIL LEAF.—7s. 9d. per oz.

CITRONELLA OIL.—Java, 2s. 9d. per lb., c.i.f. U.K. port; pure, Ceylon, 2s. 9d. per lb.

CLOVE OIL (90/92%).—6s. 6d. per lb.

EUCALYPTUS OIL, AUSTRALIAN, B.P. 70/75%.—1s. 9d. per lb.

LAVENDER OIL.—Mont Blanc, 38/40%, 11s. 6d. per lb.

LEMON OIL.—5s. 3d. per lb.

LEMONGRASS OIL.—4s. per lb.

ORANGE, SWEET.—11s. 3d. per lb.

PEPPERMINT.—13s. per lb.

London Chemical Market

The following notes on the London Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., and may be accepted as representing these firms' independent and impartial opinions.*

London, April 10, 1930.

THE demand during the current week has been rather quiet with prices generally steady and unchanged. Export business has been fair.

General Chemicals

ACETONE.—Firm at £71 10s. per ton to £80 per ton, according to quantity.
ACETIC ACID.—In very good request at £36 10s. for 80%, and £37 10s. per ton for 80% edible.
ACID CITRIC.—Very slow and easy at about 1s. 9d. per lb., less 5%.
ACID LACTIC.—In fair demand at £43 per ton for 50% by weight pale quality.
ACID OXALIC.—Unchanged and firm at £30 7s. 6d. to £32 per ton, according to quantity, with quite a good demand.
ALUMINA SULPHATE.—Firm at £8 to £8 15s. per ton for the 17/18% iron free quality and in fair request.
ARSENIC.—Easy at about £16 per ton, free on rails at mines.
BORAX.—Increased demand continues with a firm position.
CREAM OF TARTAR.—Very slow at 98s. 6d. per cwt.
COPPER SULPHATE.—Unchanged.
FORMALDEHYDE.—In good request at £34 10s. per ton.
LEAD ACETATE.—£41 10s. for white, and £40 10s. per ton for brown, and in fair demand.
LEAD NITRATE.—Quiet at £33 per ton.
LIME ACETATE.—Unchanged.
LITHOPHONE.—Steady at £19 15s. to £23 per ton, according to grade.
POTASSIUM CARBONATE.—Firm at about £27 per ton for 96/98% arsenic free quality.
PERMANGANATE OF POTASH.—Good demand continues at 5½d. per lb. for the B.P. needle crystals.
SODIUM ACETATE.—There is a little better demand at £21 10s. to £22 per ton.
SODIUM BICHROMATE.—Firm at 3⅜d. per lb., and in steady request.
SODIUM HYPO COMMERCIAL CRYSTALS.—Firm at £8 10s. to £9 per ton. The improved demand continues. Photographic crystals, £14 15s. per ton, and in good demand.
SODIUM SULPHIDE.—Rather quiet but firm at British makers' prices.
TARTAR EMETIC.—Quiet at 11d. per lb.
ZINC SULPHATE.—Unchanged at £13 per ton.

Coal Tar Products

The coal tar products market remains dull, with no change in prices to report from last week.

MOTOR BENZOL.—Unchanged, at about 1s. 5½d. to 1s. 6d. per gallon, f.o.r.
SOLVENT NAPHTHA.—Remains at about 1s. 2½d. to 1s. 3d. per gallon, f.o.r.
HEAVY NAPHTHA.—Quoted at about 1s. 1d. per gallon, f.o.r.
CREOSOTE OIL.—Unchanged, at 3d. to 3¼d. per gallon, f.o.r. in the North, and at 4d. to 4½d. per gallon in London.
CRESYLIC ACID.—Quoted at 2s. per gallon for the 98/100% quality, and at 1s. 10d. per gallon, ex works, for the dark quality 95/97%.
NAPHTHALENES.—The firelighter quality is quoted at £3 10s. to £3 15s. per ton, the 74/76 quality at £4 to £4 5s. per ton, and the 76/78 quality at about £5 per ton.
PITCH.—Nominal figure of 45s. to 47s. 6d. per ton, f.o.b. East Coast port.

The following additional prices have been received :—

CARBOLIC ACID.—Business is steady with a fair amount of inquiry, prices being unchanged from 7d. to 7½d. per lb., according to quantity.
ACETYL SALICYLIC ACID.—A moderate amount of business is being conducted for this time of the year at 2s. 9d. to 2s. 11d. per lb.
METHYL SALICYLATE.—To-day's price is 1s. 3d. to 1s. 5d. per lb.
PHENOLPHTHALEIN.—5s. 11d. to 6s. 1½d. per lb.
VANILLIN, 100%.—From Clove Oil.—Quoted at 14s. in cwt. lots. Smaller quantities, 14s. 3d. to 14s. 6d. per lb.
CRESYLIC ACID.—Pale 98%, 2s. to 2s. 2d. per gallon. Refined, 2s. 7d. to 2s. 10d. per gallon. Dark 95%, 1s. 8d. to 1s. 10d. a gallon.
SODIUM SALICYLATE B.P.—1s. 11d. to 2s. 3d. per lb. for crystals. 1s. 10d. to 2s. 2d. per lb. for powder.

Nitrogen Fertilisers Market

Sulphate of Ammonia—Export.—The price f.o.b. U.K. port remains at about £8 per ton. In large consuming countries of Europe, on account of the general over-production of foodstuffs, it is doubtful if the consumption will show a large increase on that of last year, despite the enormous decrease in price which is due to increased production of nitrogen. *Home.*—Merchants report that they are unable to give extensive credit to farmers in view of the general agricultural depression, and as a consequence purchasers of sulphate of ammonia and almost all other fertilisers are on a smaller scale this year. Although sales are not satisfactory, prices are maintained at £10 2s. per ton, delivered to farmer's nearest station, in 6-ton lots.

Nitrate of Soda.—Nitrate producers report a large sale of about 70,000 tons to Russia. This has given rise to optimistic feelings for the future, but as far as the season 1929/30 is concerned, it is very doubtful if the consumption will reach that of the previous year. The price remains unchanged in all markets.

Latest Oil Prices

LONDON, April 9.—LINSEED OIL was steady. Spot, ex mill, £41; April, £39 10s.; May-August, £39; and September-December, £38 2s. 6d., naked. RAPE OIL was firm: Crude, extracted, £39; technical refined, £40 10s., naked, ex wharf. COTTON OIL was firm and 20s. per ton higher; Egyptian crude, £29; refined common edible, £33 10s.; and deodorised, £35 10s., naked, ex mill. TURPENTINE was steady. American spot, 44s. 3d., paid; 44s. 9d., sellers; May-June, 44s. 9d.; Russian, spot, 41s. 3d. per cwt.

HULL.—LINSEED OIL.—Spot and April, £41; May-August, £39 17s. 6d.; September-December, £39 7s. 6d. per ton, naked. COTTON OIL.—Egyptian crude, spot, £29 10s.; edible refined, spot, £32 10s.; technical, spot, £32 5s.; deodorised, spot, £34 10s. per ton, naked. GROUNDNUT OIL.—Crushed/extracted, spot, £39 10s.; deodorised, spot, £37 10s. per ton. SOYA OIL.—Extracted/crushed, spot, £30 10s.; deodorised, spot, £34 per ton. RAPE OIL.—Crushed/extracted, spot, £36 10s.; refined, spot, £38 10s. per ton. TURPENTINE, CASTOR OIL and COD OIL unchanged.

South Wales By-Products

THERE is very little change in South Wales by-product activities. Business generally is on the quiet side. Pitch continues to be a slow market with supplies well in excess of demand. Patent fuel makers are not buying in any quantities, while other buyers are also holding off in anticipation of a further fall in values. Road tar is better, a steady, if moderate, demand having set in at from 10s. to 12s. per 40-gallon barrel. Naphthas are unchanged, solvent having a fair call at from 1s. 3d. to 1s. 5d. per gallon, and heavy is quiet at from 11d. to 1s. per gallon. Creosote remains dull at from 2¼d. to 2⅜d. per gallon, but motor benzol maintains its brighter tendency. Refined tars have a moderate call, with values unchanged for gasworks and coke-oven tars. Sulphate of ammonia continues to have a fair demand at about £10 2s. per ton. Patent fuel and coke exports remain moderate. Patent fuel prices for export are: 22s. to 22s. 6d. per ton, ex-ship Cardiff; from 1s. 6d. to 2s. 6d., less ex-ship Newport and Swansea. Coke quotations for furnace and foundry grades are unchanged at all South Wales ports. Oil imports into Swansea over the four weeks period closing April 1st amounted to 11,597,235 gallons.

Scottish Coal Tar Products

BUSINESS continues very quiet, and most products are unchanged in value. Refined tar is quieter than expected for the time of the year, but distillers are maintaining their prices.

Cresylic Acid.—The market continues steady with prompt supplies scarce. Pale 99/100%, 1s. 11d. to 2s. per gallon; pale 97/99%, 1s. 10d. to 1s. 11d. per gallon; dark 97/99%, 1s. 8¾d. to 1s. 9¾d. per gallon; all free on rails works. High boiling acid is quiet at about 1s. 9½d. to 1s. 11½d. per gallon.

Carbolic Sixties.—There is a good demand, but market is short of supplies. The value remains at about 2s. 4d. to 2s. 5d. per gallon for ordinary quality.

Creosote Oil is easy and quotations are unchanged as follows:—Specification oil, 3d. to 3½d. per gallon; gas works ordinary, 2⅞d. to 3⅜d. per gallon; washed oil, 3d. to 3½d. per gallon; all at works, naked.

Coal Tar Pitch.—There is very little business passing and prices are nominal. Export, 47s. 6d. per ton, f.a.s. Glasgow. Home, 50s. to 52s. 6d. per ton, ex works.

Blast Furnace Pitch has been in slightly better call. Controlled prices remain at 30s. per ton, f.o.r. works for home trade and 35s. per ton, f.a.s. Glasgow for export.

Refined Coal Tar is quieter, but makers' prices are steady at 3⅞d. to 4⅜d. per gallon, filled into buyers' packages at works.

Blast Furnace Tar remains at 2⅜d. per gallon.

Crude Naphtha.—Quotations are easy at about 4½d. to 5½d. per gallon, free on rails works.

Water White Products are quiet. 90/160 solvent is 1s. 2d. to 1s. 2½d. per gallon; 90/190, 1s. to 1s. 0½d. per gallon; motor benzole, 1s. 6¼d. to 1s. 6⅞d. per gallon, all f.o.r. works.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing this firm's independent and impartial opinions.*

Glasgow, April 9, 1930.

DURING the past week, as for some weeks past, the Scottish heavy chemical market has been rather dull, this, we think, being, with the other markets, due mostly to anticipation of what changes will occur after the Budget is issued. Local trade is going on much as before, but there is not much business passing at the moment. Prices remain unchanged.

Industrial Chemicals

ACETONE, B.G.S.—£71 10s. to £80 per ton, ex wharf, according to quantity. Inquiry remains satisfactory.

ACID ACETIC.—This material is still scarce for immediate supply, but prices remain unchanged as follows:—98/100% glacial, £56 to £67 per ton, according to quality and packing, c.i.f. U.K. ports. 80% pure, £37 10s. per ton, ex wharf; 80% technical, £37 10s. per ton, ex wharf.

ACID BORIC.—Crystals, granulated or small flakes, £30 per ton; powder, £32 per ton, packed in bags, carriage paid U.K. stations. There are a few fairly cheap offers made from the Continent.

ACID CARBOLIC, ICE CRYSTALS.—Quoted 8d. per lb., delivered.

ACID CITRIC, B.P. CRYSTALS.—Quoted 2s. per lb., less 5% ex store, prompt delivery. Rather cheaper offers for early delivery from the Continent.

ACID HYDROCHLORIC.—Usual steady demand. Arsenical quality, 4s. per carboy; dearsenicated quality, 5s. 6d. per carboy, ex works, full wagon loads.

ACID NITRIC, 80° QUALITY.—£24 10s. per ton, ex station, full truck loads.

ACID OXALIC, 98/100%.—On offer at same price—viz., 3¼d. per lb., ex store. Offered from the Continent at 3⅛d. per lb., ex wharf.

ACID SULPHURIC.—£2 15s. per ton, ex works, for 114° quality, £5 15s. per ton for 168°. Dearsenicated quality 20s. per ton extra.

ACID TARTARIC, B.P. CRYSTALS.—Quoted 1s. 4d. per lb., less 5%, ex wharf. On offer for prompt delivery from the Continent at 1s. 4½d. per lb., less 5% ex wharf.

ALUMINA SULPHATE.—Quoted at round about £7 10s. per ton, ex store.

ALUM, LUMP POTASH.—Now quoted £8 7s. 6d. per ton, c.i.f. U.K. ports. Crystal meal about 2s. 6d. per ton less.

AMMONIA, ANHYDROUS.—Quoted 7½d. per lb., carriage paid. Containers extra and returnable.

AMMONIA CARBONATE.—Lump quality quoted £36 per ton; powdered, £38 per ton, packed in 5 cwt. casks, delivered U.K. stations or f.o.b. U.K. ports.

AMMONIA LIQUID, 880.—Unchanged at about 2½d. to 3d. per lb., delivered, according to quantity.

AMMONIA MURIATE.—Grey galvanisers' crystals of British manufacture, quoted £21 to £22 per ton, ex station. Fine white crystals offered from the Continent at about £17 5s. per ton, c.i.f. U.K. ports.

ANTIMONY OXIDE.—Rather easier, and spot material now obtainable at round about £34 per ton, ex wharf. On offer for prompt shipment from China at about £30 per ton, c.i.f. U.K. ports.

ARSENIC, WHITE POWDERED.—Quoted £18 per ton, ex wharf, prompt dispatch from mines. Spot material still on offer at £19 15s. per ton, ex store.

BARIUM CHLORIDE.—In good demand and price about £11 per ton, c.i.f. U.K. ports. For Continental material our price would be £10 per ton, f.o.b. Antwerp or Rotterdam.

BLEACHING POWDER.—British manufacturers' contract price to consumers unchanged at £6 12s. 6d. per ton, delivered in minimum 4-ton lots. Continental now offered at about the same figure.

CALCIUM CHLORIDE.—Remains unchanged. British manufacturers' price, £4 15s. per ton to £5 5s. per ton, according to quantity and point of delivery. Continental material on offer at £3 12s. 6d. per ton, c.i.f. U.K. ports.

COPPERAS, GREEN.—Unchanged at about £3 10s. per ton, f.o.r. works or £4 12s. 6d. per ton, f.o.b. U.K. ports.

FORMALDEHYDE, 40%.—Now quoted £35 per ton, ex store. Continental material now on offer at about £34 per ton, ex wharf.

GLAUBER SALTS.—English material quoted £4 10s. per ton, ex station. Continental on offer at about £3 5s. per ton, ex wharf.

LEAD, RED.—Price now £37 10s. per ton, delivered buyer's works.

LEAD, WHITE.—Quoted £37 10s. per ton, c.i.f. U.K. ports.

LEAD ACETATE.—White crystals quoted round about £39 to £40 per ton, ex wharf. Brown on offer at about £2 per ton less.

MAGNESITE, GROUND CALCINED.—Quoted £8 10s. per ton, ex store. in moderate demand.

METHYLATED SPIRIT.—Industrial quality 64 O.P. quoted 1s. 4d. per gallon, less 2½% delivered.

POTASSIUM BICHROMATE.—Quoted 4¾d. per lb., delivered U.K. or c.i.f. Irish ports, with an allowance for contracts.

POTASSIUM CARBONATE.—Spot material on offer at £26 10s. per ton, ex store. Offered from the Continent at £25 5s. per ton, c.i.f. U.K. ports.

POTASSIUM CHLORATE, 99¾/100%.—Powder quoted £25 10s. per ton, ex wharf. Crystals 30s. per ton extra.

POTASSIUM NITRATE.—Refined granulated quality quoted £19 2s. 6d. per ton, c.i.f. U.K. ports. Spot material on offer at about £20 10s. per ton, ex store.

POTASSIUM PERMANGANATE, B.P. CRYSTALS.—Quoted 5¼d. per lb., ex wharf.

POTASSIUM PRUSSIATE (YELLOW).—Spot material quoted at 7d. per lb., ex store. Offered for prompt delivery from the Continent at about 6¾d. per lb., ex wharf.

SODIUM BICARBONATE.—Refined recrystallised, £10 10s. per ton, ex quay or station. M.W. quality 30s. per ton less.

SODIUM BICHROMATE.—Quoted 3⅞d. per lb., delivered buyers' premises, with concession for contracts.

SODIUM CARBONATE (SODA CRYSTALS).—£5 to £5 5s. per ton, ex quay or station. Powdered or pea quality 27s. 6d. per ton extra. Light soda ash £7 13s. per ton, ex quay, minimum 4-ton lots, with various reductions for contracts.

SODIUM CAUSTIC.—Powdered, 98/99%, £17 10s. per ton, in drums, £18 15s. per ton in casks. Solid, 76/77%, £14 10s. per ton in drums; £14 12s. 6d. per ton for 70/72% in drums, all carriage paid buyers' stations, minimum 4-ton lots. For contracts 10s. per ton less.

SODIUM HYPOSULPHITE.—Large crystals of English manufacture quoted £8 17s. 6d. per ton, ex station, minimum 4-ton lots. Pea crystals on offer at £14 15s. per ton, ex station, minimum 4-ton lots. Prices for this year unchanged.

SODIUM NITRATE.—Chilean producers are now offering at £10 2s. per ton, carriage paid buyers' sidings, miminum 5-ton lots, but demand in meantime is small.

SODIUM PRUSSIATE.—Quoted 5¾d. per lb., ex store. On offez at 5d. per lb., ex wharf, to come forward.

SODIUM SULPHATE (SALTCAKE).—Prices 55s. per ton, ex works; 57s. 6d. per ton, delivered, for unground quality. Ground quality 2s. 6d. per ton extra.

SODIUM SULPHIDE.—Prices for home consumption. Solid, 60/62%, £9 15s. Broken, 60/62%, £10 15s. per ton. Crystals, 30/32%, £7 17s. 6d. per ton, all delivered buyers' works on contract, minimum 4-ton lots. Special prices for some consumers. Spot material 5s. per ton extra.

SULPHUR.—Flowers, £12 per ton; roll, £10 10s. per ton; rock, £9 5s. per ton; ground American, £9 5s. per ton, ex store.

ZINC CHLORIDE, 98%.—British material offered at round about £20 per ton, f.o.b. U.K. ports.

ZINC SULPHATE.—Quoted £10 per ton, ex wharf.

NOTE.—The above prices are for bulk business, and are not to be taken as applicable to small parcels.

Fire at Newcastle Gasworks

ABOUT £10,000 damage was done by a fire on Friday, April 4, at St. Anthony's by-product works of the Newcastle and Gateshead Gas Co. The Newcastle Fire Brigade was summoned and was soon at work, but the buildings were then blazing furiously. Their contents consisted of tar-oil and naphtha, one of the sheds alone containing over 60 tons of the latter spirit. The premises were badly wrecked, and one of the principal buildings, erected only six months ago, was a mass of twisted ironwork after the fire Fortunately, the principal work of tar distillation will not be affected, and no men will be thrown out of work

World Output of Synthetic Camphor

DR. F. BORNEMANN, in the *Chemiker-Zeitung*, estimates the world output of synthetic camphor at about 23,000 kilos per day, of which about 18,000 kilos are manufactured in Germany, the remainder being produced in France, Switzerland, and Italy. The total utilisation of both natural and synthetic camphor is distributed approximately as follows: 66 per cent. to the cellulold industry, 14 per cent. to the manufacture of disinfectants and similar products, 10 per cent. to the pharmaceutical industry, and 10 per cent. to the manufacture of explosives.

Manchester Chemical Market

(From Our Own Correspondent.)

Manchester, April 10, 1930.

Although there is a fairly steady call for deliveries against old commitments, fresh business on the Manchester chemical market during the past week has not been at all active, and competition among sellers is very keen for the relatively limited number of orders that are offering. With Easter near at hand, the probability is that conditions will remain sluggish over the next fortnight at least. Within the next few days, however, the Budget bogy will be out of the way, and this is a factor which will be all to the good. Taking the market as a whole, quotations are very steady in respect of most lines.

Heavy Chemicals

A quiet business is going through in the case of saltcake, current values of which are at about £3 per ton. There is a moderate inquiry about for sulphide of sodium and prices in this section are well maintained at £9 15s. per ton for the 60-65 per cent. concentrated solid quality and round £8 for the commercial grade. Caustic soda is fairly active and contract prices continue to range from £12 15s. to £14 per ton, according to quality. At the moment, buying interest in chlorate of soda is by no means extensive, but there has been no change in the price position, offers ranging from £25 to £27 per ton, ex store. Phosphate of soda is steady and a quiet trade is going through at up to £11 10s. per ton for the dibasic material. Bichromate of soda is attracting a fair amount of attention from buyers and values are firm on the basis of 3⅜d. per lb., less discounts of 1 to 2½ per cent., according to quantity. Not much business has been reported this week in the case of glauber salts, but at round £2 15s. per ton prices are pretty much as before. Bicarbonate of soda is in quietly steady demand at £10 10s. per ton, in contracts, as is also alkali at about £6 per ton. With regard to hyposulphite of soda, sales during the past week have been on the quiet side, with the photographic material on offer at £15 to £15 10s. per ton and the commercial at round £9.

Yellow prussiate of potash keeps firm at from 6¾d. to 7¼d. per lb., according to quantity, and a moderate active business is being transacted. Permanganate of potash is steady although buying interest is of limited extent; the B.P. quality is at round 5½d. per lb. and the commercial at 5¼d. Offers of chlorate of potash range from about £26 to £28 per ton, ex store and according to quantity, without any marked expansion in the weight of business being done. Bichromate of soda is in moderate request and values are maintained at 4⅜d. per lb. Both carbonate and caustic potash are quiet but reasonably steady at about £26 5s. and £30 10s. per ton, respectively.

The demand for arsenic on this market continues slow, and down to about £15 15s. per ton, at the mines, for white powdered, Cornish makes, is being currently indicated for this material. Sulphate of copper is attracting only a little attention and quotations are easy at from £26 to £26 5s. per ton, f.o.b. The acetates of lime show little change on balance for the week, a moderate business being done on the basis of £15 10s. per ton for the grey quality and £7 10s. for the brown. The lead products are comparatively slow and not too strong; nitrate is on offer at £31 10s. to £32 per ton and white and brown acetate at £38 and £37.

Acids and Tar Products

Inquiry for tartaric acid this week has been on a restricted scale and at about 1s. 3d. per lb. the price position is not too strong. With regard to citric acid, there has been no further actual weakness, and a moderate trade has been done at round 1s. 8¾d. per lb. Acetic acid is firm and in fair request at £36 per ton for the commercial 80 per cent. strength and £66 for the glacial. Oxalic acid is quiet but unchanged on the week at round £1 12s. 6d. per cwt. ex store.

For the most part the by-products market is in a subdued condition. Pitch in particular is now very slow for export and prices are nominal at 47s. 6d. per ton, f.o.b. Creosote oil is in plentiful supply at about 4d. per gallon at works, but the demand for this material is poor. Solvent naphtha is in moderate inquiry at round 1s. 2¾d. per gallon, naked, at works. A quiet business is being done in the case of carbolic acid, with crystals at about 7¼d. per lb., f.o.b., and crude 60's quality at 2s. 5d. to 2s. 6d. per gallon, naked.

Company News

Burt, Boulton and Haywood.—An interim dividend for the year ending June, 1930, of 4 per cent., less tax, has been declared on the ordinary shares, payable on April 23.

Borax Consolidated.—The directors decided at their board meeting on Wednesday to postpone the consideration of payment of the dividend on the preferred ordinary shares until the accounts for the full financial year terminating September 30 next are available.

Niger Co.—For the year ended June 30, 1929, the company earned a gross profit of £576,666, against £601,572 for the previous year. After allowing for debenture interest, there remains £257,723, which with £228,129 brought in gives a total of £485,852. Fixed dividends absorb £311,000, and a dividend of 5 per cent. on the ordinary shares, the majority of which are held by Lever Brothers, requires £62,500. There has been written off discount and expenses of debenture stock issue £45,535, leaving £67,818 to go forward. The company has now ceased to trade and has become a holding company.

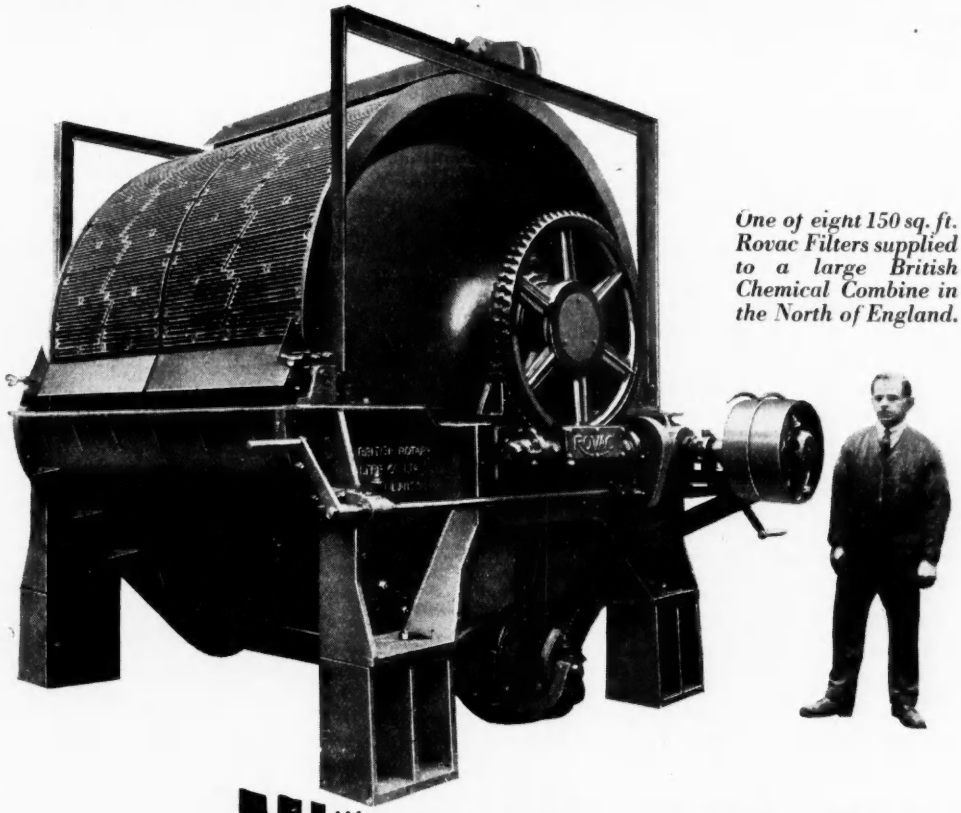
Rio Tinto Co.—The net trading profit for 1929 amounts to £1,812,199, against £1,669,782 for 1928. Other credits brought into revenue account were £117,911, making a total of £1,930,110. After deducting costs of administration, writings-off and other expenses and provisions, amounting to £643,831, there remains £1,286,279, which with £167,372 brought in makes £1,453,650. As already announced, the directors propose a final dividend on the ordinary shares of 25 per cent., together with a bonus of 5 per cent., making a total distribution of 55 per cent., against 40 per cent. for 1928, carrying forward £203,650.

Associated Dyers and Cleaners.—A profit of £81,337 is reported for the year 1929, against £87,485 for 1928. A sum of £27,556 is brought forward, making an available total of £108,893. The directors recommend a final dividend on the ordinary shares of 1s. 4d. per share (less tax), making 10 per cent. for the year, plus a bonus distribution of 2½ per cent. (less tax), payable on April 30, 1930, paying as bonus to employés £8,800, transferring to general reserve £10,000, and to special depreciation reserve £5,000, carrying forward (including provision for accrued dividend, less tax, on 500,000 preference shares for two months to December 31, 1929, £4,333), £24,293. Under the terms of issue, the 100,000 new ordinary shares (Nos. 400,001-500,000) do not rank for dividend until January 1, 1930.

Chemical and Metallurgical Corporation.—The report of the directors for the year 1929 shows an addition to suspense account of £207,645, mainly relating to the ore treatment process, but including also the expenditure on platinum extraction. The total of expenditure in suspense to be dealt with, after adding the trading loss for the past year, is £446,607. The trading loss is £41,877, before charging depreciation of buildings, plant and machinery. Further, such items as patents, etc., standing in the balance sheet at £251,868, and £38,114 in respect of subsidiary companies, both referring mainly or wholly to the ore treatment process, will have to be dealt with. The directors, however, in view of the position created in the matter of pending litigation, consider it unwise at the moment to put forward proposals for a revision of the capital account.

Revenue from Oil Duties

Replying to Mr. Muff (House of Commons, April 3), Mr. Pethick-Lawrence stated that a remission of the duties on hydrocarbon oils, turpentine and white spirit, used by paint and varnish manufacturers, it was anticipated would cost £1,000,000 a year. In answer to a further question, Mr. Pethick Lawrence said the approximate amount of revenue derived from the duty on turpentine, from its imposition in April, 1928, to the end of February last was £125,000.



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The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

County Court Judgments

[*NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.*]

BRITISH BY-PRODUCTS, LTD., Lower Road, Northfleet, paint manufacturers. (C.C., 12/4/30.) £68 0s. 1d. February 12.

BROWN, James, Croft House, Wheelwright Lane, Coventry, analytical chemist. (C.C., 12/4/30.) £15 5s. 5d. February 22.

Mortgages and Charges

[*NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.*]

ENDOCRINES, LTD., London, W., manufacturers of medicinal preparations. (M., 12/4/30.) Registered March 29. £500 and £500 debentures, part of £5,000; general charge (except property at Watford, on which they are a second charge). *Nil. March 31, 1929.

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Company Winding Up

MATTHEWS AND WILSON, LTD. (C.W.U., 12/4/30.) Winding up order, March 31.

Notice of Dividend

WHIPMAN, Philip, lately carrying on business at St, Dunstan's House, 8, Cross Lane, London, E.C.3, and at 6, Bakers' Row, Farringdon Road, London, E.C.1, drug merchant. First and final dividend, 2s. 6d. per £, payable, Bankruptcy Buildings, Carey Street, London, W.C.2.

Partnership Dissolved

RUBECK THEW AND CO. (Carl Wilhelm Gustav RUBECK and Sidney Alfred THEW), shellac and chemical merchants and manufacturers, 16, Mincing Lane, London, and Ormside Works, Holmethorpe, Redhill, by mutual consent as from March 31, 1930. Debts received and paid by C. W. G. Rubec, and S. A. Thew.

WINDHILL DYEING CO. (Edgar BRIGGS, Matthew Henry GARBUTT, Joseph Arthur KELLETT and Joseph COOPE), dyers, Clifton Street, Bradford, by mutual consent, March 31st, 1930. Debts received and paid by M. H. Garbutt, J. A. Kellett and J. Coope, who will continue the business.

New Companies Registered

NORCO, LTD., Dock Road, Birkenhead.—Registered March 27. Nominal capital, £2,500 in £1 shares. To adopt an agreement with F. L. Williams and A. Brierley and others for the acquisition (*inter alia*) of the registered trade mark "Norco," No. 438,298, dated June 21, 1923, to manufacture, treat, refine and deal in all kinds of natural, raw and manufactured produce containing or useful in the production and treatment of oils and fats and the like; seed crushers and manufacturers of linseed, cotton and other cakes, oil extractors, etc. Directors: W. M. Christian and R. D. Petty.

STARCH PRODUCTS, LTD.—Registered, April 4. Nominal capital, £3,000 in 5,000 6 per cent. cumulative preference shares of 10s. each and 10,000 ordinary shares of 1s. each. Manufacturers, importers and exporters of and dealers in gums, glues, gelatines, sizings, starches and their derivatives, dextrines and other adhesives, etc. Directors: D. R. Anstee, W. H. Squire, "Chandos," Farnham Royal; F. M. Nicholas, A. Ellis.

WALLIS LABORATORY, LTD.—Registered April 5. Nominal capital, £500 in £1 shares. To acquire the business of a chemical manufacturer and laboratory proprietor, etc., carried on by G. H. Wallis at King George's Avenue, Watford, as the "Wallis Laboratory." Directors: G. H. Wallis, 350, Whippendell Road, Watford; L. T. Tuck.

Tariff Changes

GREECE.—Increases of Greek customs duties were enforced on April 1 in consequence of the revision of the Commercial Convention of 1929 between France and Greece. The increasess are applicable to imports from the United Kingdom, and the following is a list of the rates for chemical products: bicarbonate of soda, 8 gold drachmae per 100 kilogs (in place of 6); carbide of calcium (apart from internal tax), 20 (14); liquid pharmaceutical extracts (without alcohol), 160 (120); soft pharmaceutical extracts, 200 (160); dry pharmaceutical extracts, 300 (220); liquid pharmaceutical specialities in flasks, 200 (180); solid ditto in boxes or flasks, 250 (220); mint alcohol, 400 (300).

ROUMANIA.—A recent Roumanian Customs circular announces that samples of chemical products, to a maximum weight of 150 grammes, will be admitted duty-free if sent direct to the trader's or manufacturer's address, and if not more than two samples of the same kind of goods are consigned to the same importer. The samples may on no account be sold in commerce.

Successful Action by May and Baker

IN the King's Bench Division on Tuesday, Mr. Justice Roche concluded the hearing of an action by May and Baker, Ltd., chemical manufacturers, of Battersea, against Harris Williams (Manufacturers), Ltd., Battersea, to recover the sum of £300, value for goods supplied to the Premier Gas Mantle Co., Ltd.

The plaintiffs supplied the chemical material for making gas mantles to the Premier Co., for whom the defendants were selling agents. When the debenture holders of the Premier Co. put in a receiver the plaintiffs alleged that the defendants agreed to pay them the sum owing by the Premier Co., if the plaintiffs would continue to afford to the defendants the same credit facilities that they had given to the Premier Co. This promise to pay, plaintiffs alleged, was contained in two letters from the defendants.

The defendants submitted that the letters did not constitute an agreement to pay; but were given *ex gratia* without any legal responsibility. Alternatively the defendants said that if the letters did constitute an agreement to pay the Premier Co.'s debt, plaintiffs had failed to grant them credit facilities.

His Lordship held that the letters did constitute an agreement to pay and gave judgment for the plaintiffs for the amount claimed, with costs.

New Benn Books

NEW books announced for early publication by Ernest Benn, Ltd., include the following: *Catalogue of the George Eumorfopoulos Collection of Chinese Bronzes*, Volume II, edited by W. Perceval Yetts. Ordinary edition, 12 guineas; edition de luxe, leather, 25 guineas; *The Complete Works of Percy Bysshe Shelley*, edited by Roger Ingpen and Walter E. Peck, Volume VII, 63s. net; *Joan of the Pilchard*, by Mary Gaunt, 7s. 6d.; *The Lady of the Camelias*, by Alexandre Dumas, translated by Sir Nigel Playfair and Miss Reynolds, 3s. 6d.; *The Printing of Etchings and Engravings*, by David Strang, 10s. 6d.; *English Mediæval Enamels*, by Miss M. Chamot, 7s. 6d.; *Interrelation of the Fine Arts in England in the Early Middle Ages*, by Miss M. Dickens-Whinney, 7s. 6d. net; *Encyclopædia of the Ceramic Industries*, Volume III, by A. B. Searle, 9 guineas the set of three volumes; "*The Electrician*" *Annual Tables of Electricity Undertakings*, 1930, 10s.